The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879

CLINTON S. DARLING, Editor
CHARLES A. BRESKIN, Adv. Mgr.
E. M. GIBSON, Asst. Mgr.
JOSEPH K. COSTELLO, Central Rep.
N. C. ROCKWOOD, Advisory Editor
H. E. HOPKINS, Associate Editor
ALLAN B. SANGER, Eastern Rep.
GEO. P. MILLER, Manager

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MEMBER A. B. C. MEMBER A. B. P.

W. D. CALLENDER, President
N. C. ROCKWOOD, Vice-President
GEO. P. MILLER, Treasurer
C. O. NELSON, Secretary

Volume 25 August 26, 1922 Number 17

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"They Read, and Profit by Their Reading"

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The editor offered to publish a notice stating the specific requirements to see if any of the readers of Rock Products had material to fulfill the requirements. The notice was published.

Magazines of the last issue were in the mails Saturday morning and delivered probably on Monday and Tuesday to most subscribers. On Tuesday the editors received two replies from producers who could supply material meeting the specifications. On Wednesday, another reply came; on Thursday, two more; and on Friday, still two more, until seven replies, representing probably all the producers of materials meeting the specified requirements within possible shipping distance of the points named, had been received within a period of five days.

The inquiry meant real business, and in considerable quantities, for some producer of this material. Those producers who read promptly and carefully the magazine were the first on the job and, without question, one or more of the seven producers is profiting by his prompt reading.

Careful reading of Rock Products does not always bring such definite returns in immediately increased business, but there are always dozens of valuable operating or marketing suggestions which help the reader to increase output, to decrease cost, or in some other way to add to the profits of his operation.

Always Glad to Help

The instance just related is typical of the desire of every member of Rock Products organization to be of help to any and every member of the industries the magazine serves. If it is by the publication of some legitimate notice or news-item or if it is in the search for material, the answer to questions, the reference to other competent authorities, or by any other means, service rendered is always willingly done, for it is both the aim and pleasure of Rock Products and all connected with it to serve all who depend upon it.

The Chemical Show

Producers of chemical lime will profit by a visit to the National Exposition of Chemical Industries to be held at the Grand Central Palace, New York, September 11 to 16. The coming issue of Rock Products will devote a considerable amount of space to the most recent developments in chemical uses of lime, and copies will be distributed at the exposition.

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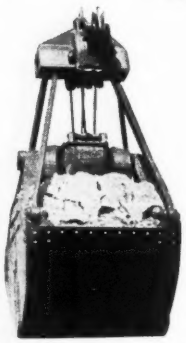
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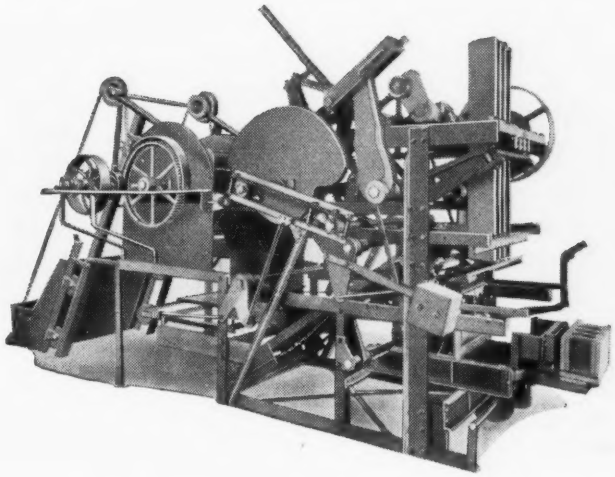
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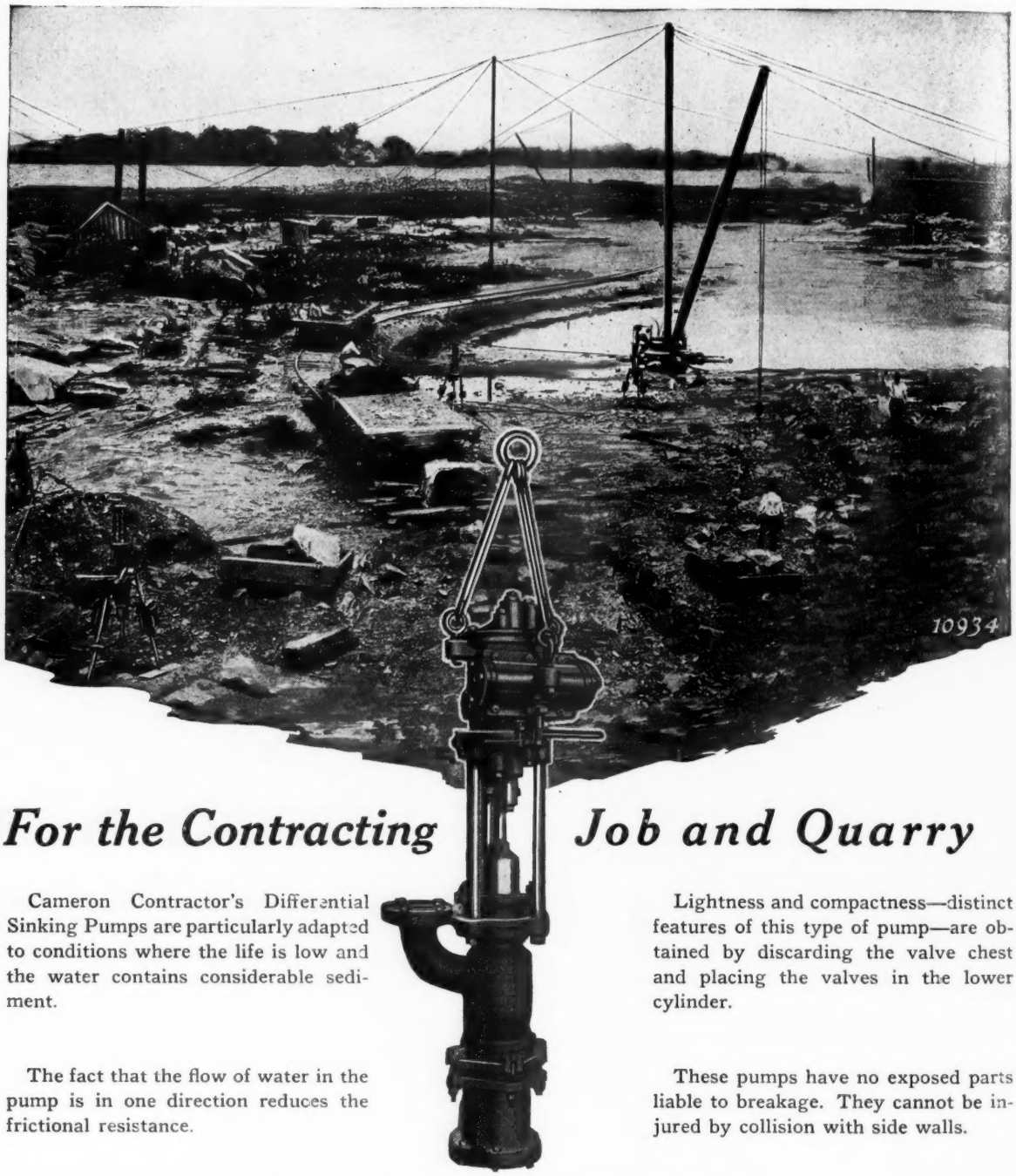
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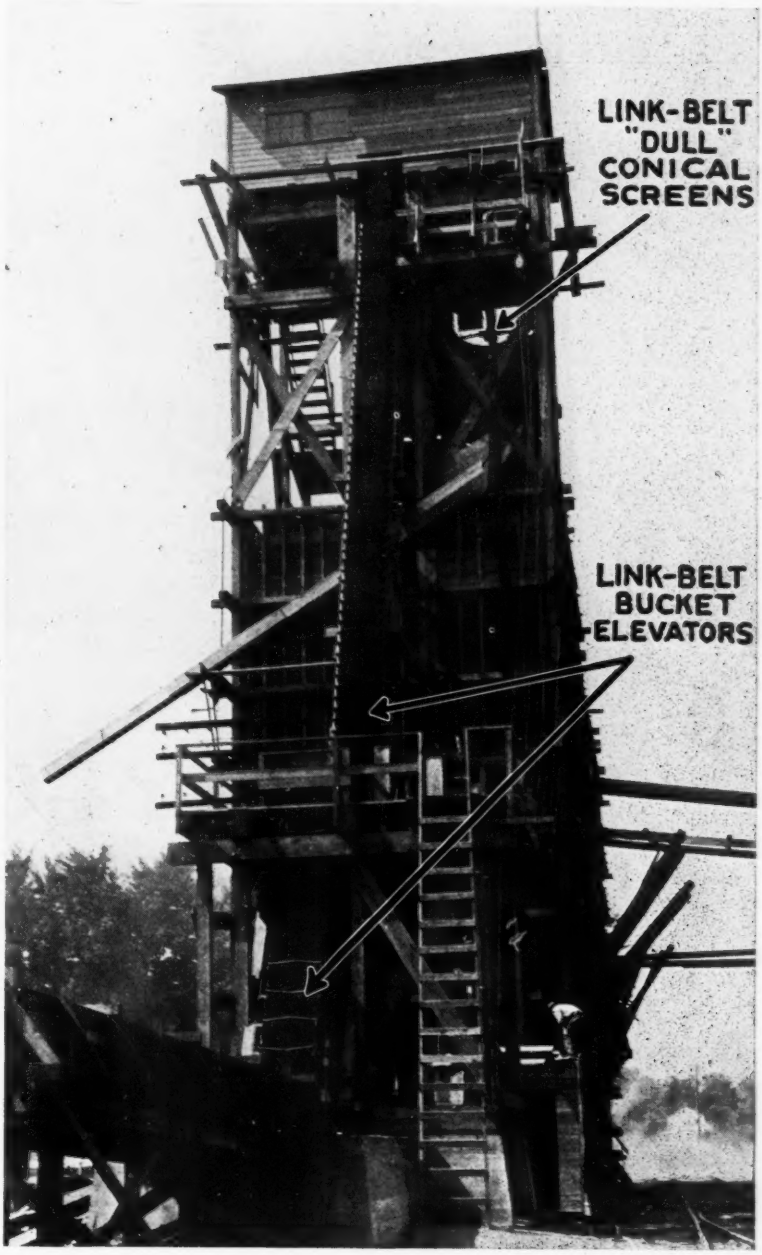
The insistent demands of contractors for clean sand and gravel led the Rock Island Sand & Gravel Company to thoroughly investigate the possibility of making really a clean product. The result is the plant shown herewith, which is Link-Belt equipped.

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Our experienced engineers will be glad to work with you in finding the equipment that will produce clean gravel under the conditions that confront you.

1008



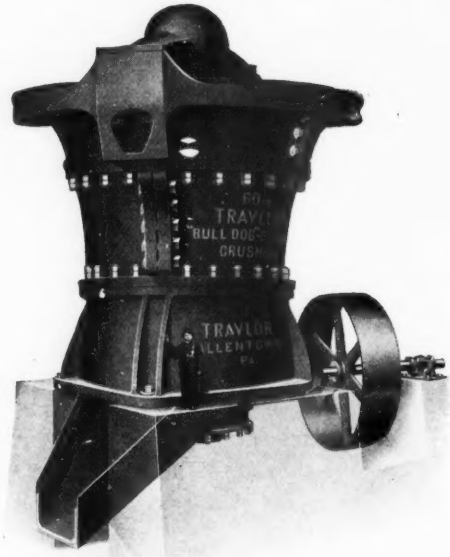
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We purchased in February, 1918, two PLYMOUTH Locomotives and one in January, 1919.

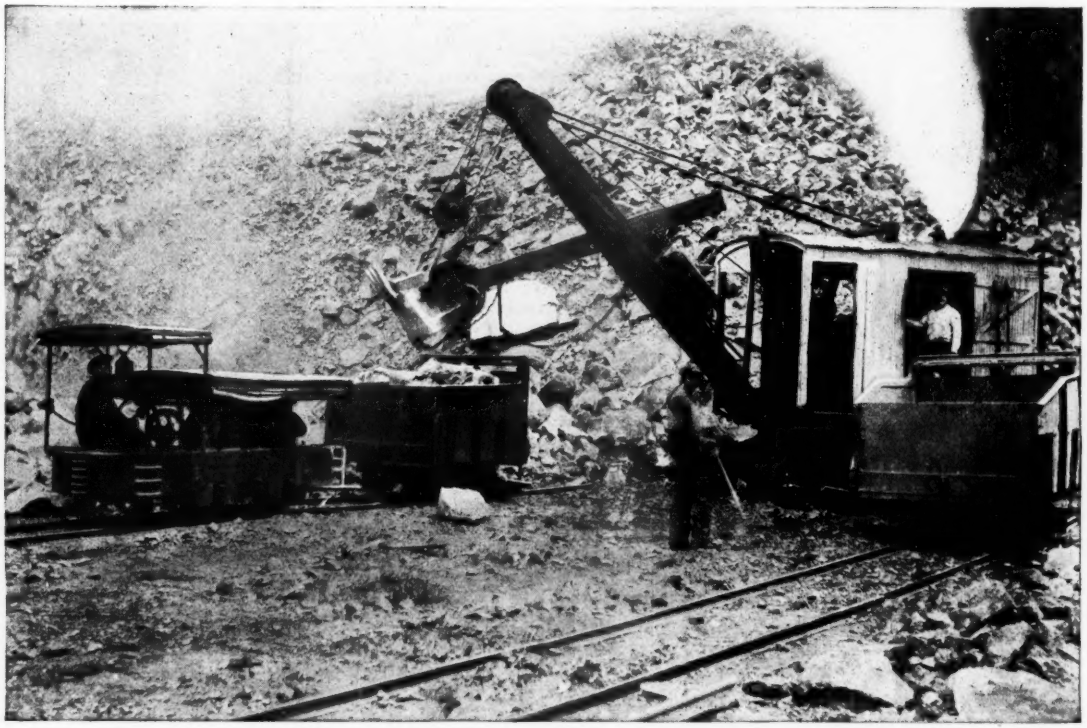
These have been in operation since that time more or less continuously.

From our experience we cannot recommend too strongly the PLYMOUTH.

All your selling arguments have been verified and repair costs have been lower than we had expected.

It is with pleasure, from the results we have had, that we offer our hearty recommendation to prospective purchasers of your Gasoline Locomotives.

Yours very truly,
The Connecticut Quarries Co.
B. D. Pierce, Jr., Pres.



PLYMOUTH in Equipment of Connecticut Quarries Company, New Haven, Connecticut

Rock Products

Volume XXV August 26, 1922 Number 17

Getting Better Gravel From the Mississippi River

A modern, well-designed plant, following a careful survey of materials available, makes this sand and gravel operation one worth studying for good operating ideas

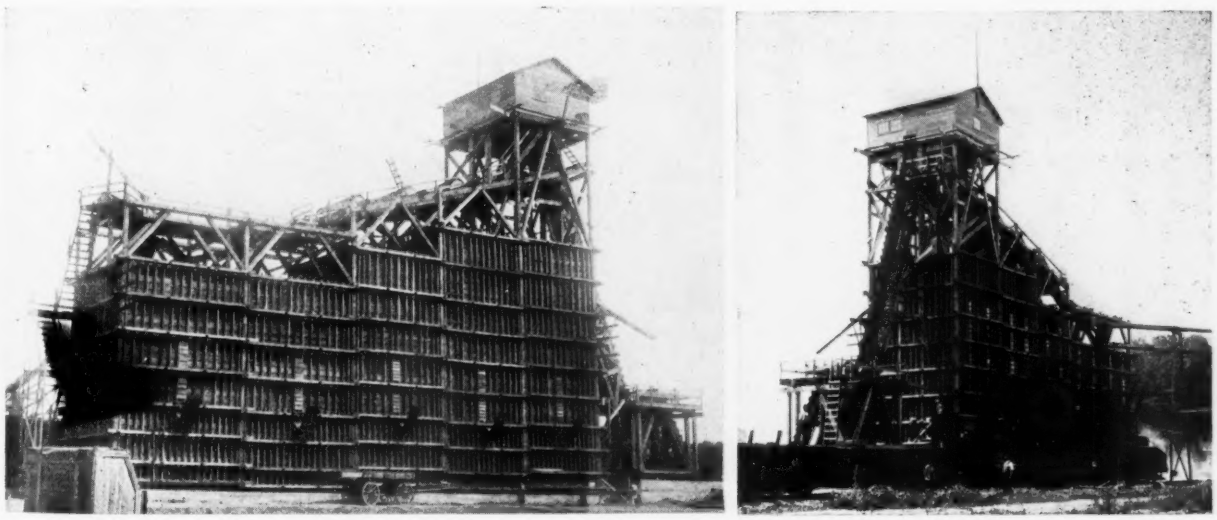
THERE was a time when sand and gravel products along the Mississippi river meant merely going down the river in a makeshift boat equipped with any sort of a device that would reclaim sand found in the river. From this crude stage the development proceeded to where a pump was employed, and finally to the elaborate self-propelled sand dredges that are found along the Mississippi today. However, even in this modern stage of development, sand and gravel that was really clean and screened could not be produced.

The Rock Island Sand and Gravel Co. realized that the time had approached when contractors would use nothing but clean sand and gravel, and not the sand that was formerly taken from the Mississippi with all its impurities. Accordingly they made an exhaustive survey of the river, and located a spot where they could get an excellent grade of material. They then investigated the latest and most modern methods of sand and gravel products, and constructed the plant that is described in detail below.

The Sand Dredge

The sand dredge is constructed entirely of wood, and was creosoted to make it waterproof. The material is pumped by a 10-in. American manganese steel pump, which is belt connected to a 200-hp., 440-v., 3-phase, 240-amp., 60-cycle, 705 r.p.m. motor. The belt is 18 in. wide, running over 26 ft. centers. The main pump is primed by a 2-in. Dayton-Dowd centrifugal direct connected to a 5-hp. motor. The pump has both a 10-in. suction and a 10-in. discharge. The suction nozzle of the pump is attached to a boom supported by an "A" frame on the dredge. The boom is operated by a small 3-drum Clyde hoist which is belt connected to a 15-hp. motor. The hoist swings the boom and lowers and raises it, so that the suction nozzle and cutterhead may be placed in any desired spot. The 10-in. centrifugal pump operates under a 15-ft. head.

The dredge is anchored by two 40-ft. spuds, one of which is electrically driven



From this modern 1000-ton a day plant trucks are loaded at the side shown at left, while the side shown at the right is for car loading



Stripping is accomplished with the tractor and scraper shown above, and the overburden discharged to wagons as at the right



and one hand driven by means of rack and pinion.

The dredge is arranged so that all controls are within easy reach of the operator. All machinery controls are automatic so that it is not at all difficult for one man to guide the entire operation. The dredge is a result of 20 years' experience of the Rock Island Sand and Gravel Co. in pumping sand and gravel from the Mississippi river.

The plant and the property on which the sand deposit is located is just within the city limits of Rock Island, and consists of 53 acres of land. The average overburden of the sand and gravel is from nothing to 5 ft. and consists of a heavy clay. Below this is an 18-in. deposit or vein of fine molding sand This sand is especially clean and free from organic matter due to the fact that the heavy clay on top of it prevents any foreign matter from penetrating into the sand. Underneath the molding sand is a 20-ft. vein of excellent sand and gravel, and below that is a hard limestone formation.

In the operation of this plant the stripping of the overburden was let to a contractor who utilized a Holt tractor, and a Western road scraper, equipped with a belt conveyor. The methods employed in the stripping of the overburden are illustrated in the accompanying photographs. The overburden from this deposit was used in reclaiming swamp and makes excellent farming land.

The 10-in. discharge pipe from the dredge to the plant was laid underground through a distance of 500 ft. As it reaches the plant the pipe is elevated so as to discharge to a concrete sump box or flume which is approximately 7 ft. above the ground level. The pipe is laid underground so as to make stripping possible without injury to the pipe, and at the same time make pumping possible. As the material between the river and the plant is excavated the dredge will be brought gradually closer and closer to the plant, and eventually it will be possible to load barges directly from the plant, and then tow them up the Mississippi river to the local distributing point in Rock Island.

As the plant stands now, material required for barge loading will first have to be loaded into wagons or trucks and then conveyed to barges.

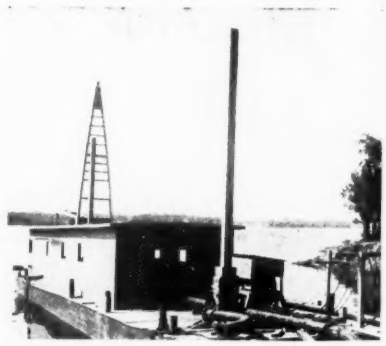
Getting Sand to the Screens

The sump that receives the material from the 10-in. pump line is 10x30x10 ft. and is constructed of concrete. In this sump is installed a dredging elevator of 21-ft. centers with 30x12x18 in. specially constructed ingot iron buckets, operating at a speed of 60 ft. per minute. The links and rollers of this elevator are also made of ingot iron so as to insure maximum service under the severest strains. This elevator is of Link-Belt design and manufacture.

The sump box has a perforated floor which allows the water to seep through into the gravel below. This water (as will be described further on) is picked up by a deep well pump and is used for washing purposes. The gravel bed acts as a filter for the water so that even though the same water is used over and over again, it is always clean.

A feature worth special notice on the dredging elevator is the construction of the re-enforced lips. As can be seen from some of the accompanying photographs, one lip projects outward, and this lip forms the digging bucket; the next bucket has the lip projected inwards and this is the dragging bucket. The dredging elevator is chain driven from a 20-hp. induction motor.

The dredging elevator discharges over its head pulley into a hopper feeding the main elevator which carries the material to the top of the screening plant for its final washing and grading. The main elevator



The suction nozzle of the dredge is suspended from the boom as shown below. The right-hand view shows the rear spud, which is hand-operated, while the forward spud is electrically operated

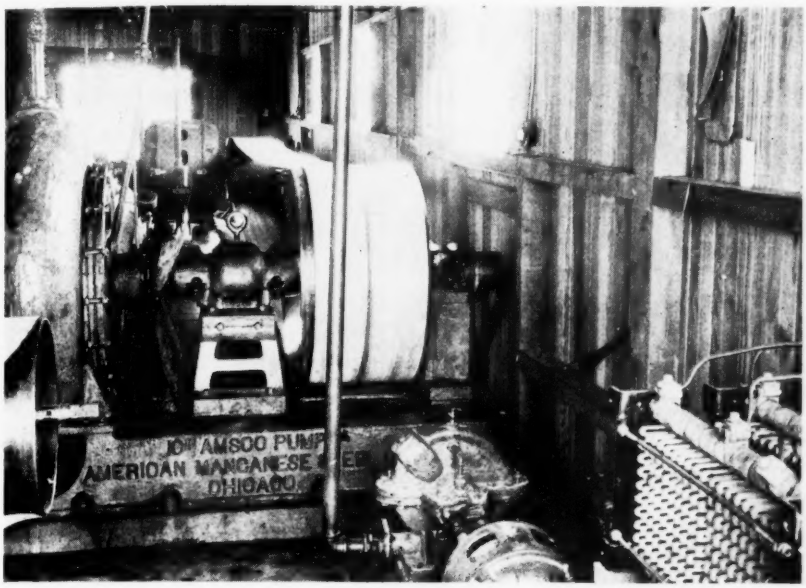


is 64 ft. between centers and has 24x12x18 in. buckets operating at a speed of 90 ft. per minute. The pins and bushings on this elevator are all manganese steel, the pins having case hardened heads. The outside and inside links are constructed of 40 per cent carbon steel and the sprockets are all cast steel, split, and with renewable manganese steel teeth. The main elevator is situated so that it discharges directly to a set of four conical screens and two sand separators. At the present time there is only one set of screens, but provision has been made for two and since the main elevator is situated directly between the two sets, the material can be by-passed into either one or both sets of screens as the case may be.

The four screens are 36x72x96 in. of the Dull conical type followed by two 72-in. Dull sand separators. The first screen has 2-in. perforations and everything over 2 in. is rejected. The second screen sizes material from 2 in. down to 1¼ in., the third from 1¼ to ¾ in., and the fourth ¾ to 3/16 in. The sized material falls directly from the screen into the bins below.

The material under 3/16 in. is run over a steel pan flume to the first sand separator. The flume here has ⅛-in. perforations so that all material ⅛ in. and under goes to the first sand separator while all material from ⅛ in. to 3/16 in. goes to the second sand separator.

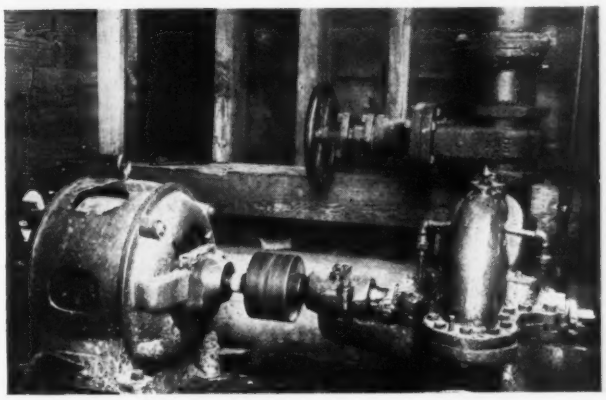
The main elevator and screens are silent chain driven from a 50-hp. General Electric induction motor. This motor is located in the top of the screen house where are also located two starting compensators, one for the dredging elevator and one for the main elevator. A switch is also provided at the bottom of the plant so that either elevators or screens can be stopped in an emergency.



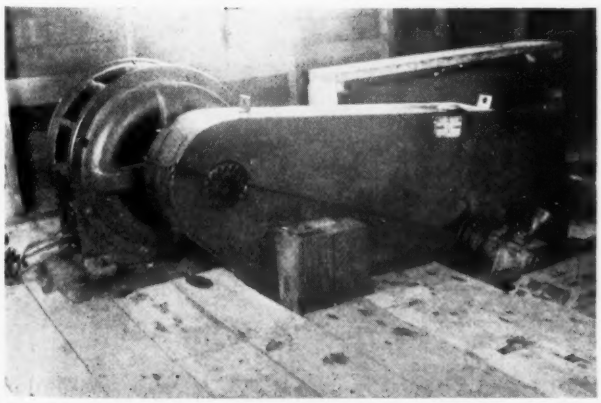
This 10-in. main pump of manganese steel is driven by a 200-hp. motor and primed by the 2-in. centrifugal pump shown in the foreground

What Makes the Plant Go

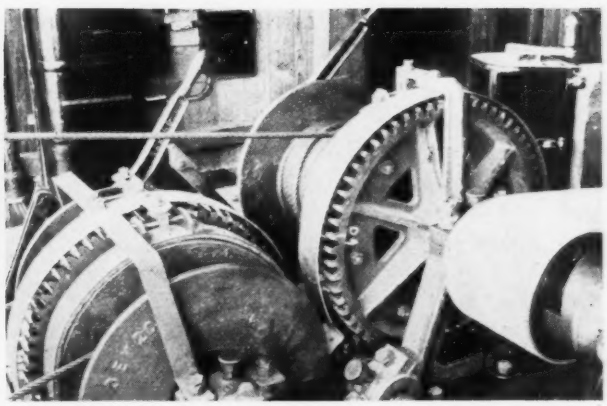
Five close-up views of machinery details at the Rock Island Plant



Operating under an 85-ft. head this 4-in. centrifugal pump at the right raises naturally-filtered water to the screens for thoroughly washing the gravel



Another detail of plant operation—the 50-hp. motor and chain drive which actuates the main elevator and screens



On the dredge this 3-drum hoist is used for raising and lowering the suction nozzle boom

Electrical signals are provided from the dredge to the screening plant so that the entire operation is interlocked. In case anything goes wrong with any one unit, the other units depending on it are automatically stopped.

Screening the Material

The screening plant is of Link-Belt design and is 21 ft. wide and 67 ft. high from the top of the concrete foundation to the top of the screening house at the elevator end, and 32 ft. high at the opposite end. The bins are five in number, 89 ft. in length, and have a total capacity of 1200 yds. The screening plant proper was constructed by the Rock Island Sand and Gravel Co. itself, and its construction entailed the use of 120,000 ft. of Oregon fir lumber. The bins are creosoted both inside and out, and the bottom is perforated thus allowing the water used in washing the material to seep through into the gravel below. Holes have been built here so as to allow the water to go through the filter bed. The water is reclaimed by the deep well pump and is used for washing purposes. Water acquired for washing in the screening plant is supplied by a 4-in. Dayton-Dowd centrifugal pump which is direct connected to a 20-hp. induction motor running at 1780 r.p.m. This pump takes the water from a 25-ft. deep well and elevates it 60 ft. above that, making the total head 85 ft. The pipe leading down to the well is perforated 5 ft. from the bottom of the well so that it draws only that water which has filtered through the 20-ft. vein of gravel. This insures absolutely filtered water and gives the gravel a thorough washing with clean water each time. Spray pipes are provided in the screens, so as to help both washing and sizing.

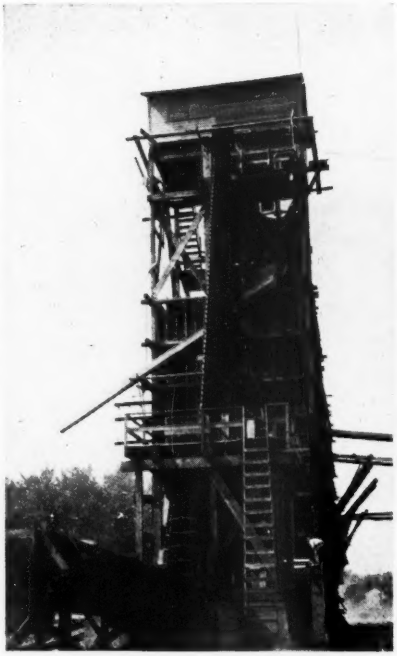
The waste water from the screens and sand separators is returned to the Mississippi river through a 10-in. pipe line. This is also laid underground similar to the dredge line.

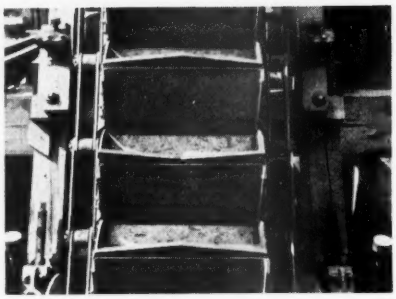
A feature in connection with the dredge pipe line leading to the sump is the installation of "T" valves, to prevent gravel from "sticking." In case the gravel should stick, the head is simply lifted off and water is injected in the pipe line from a high pressure pump. In this manner the gravel is washed out immediately and this obviates the necessity of a forced shutdown.

Another feature in this plant is the provision made for taking care of excess sand. In case the sand bins should be full and the separators have no place to discharge, an extra spray of water is introduced into the separators thus forcing the sand and water into a box leading to another flume. This flume consists of 10-in. removable pipe and screens can be placed at any desired point on the trestle. The sand is thus deposited in ground storage under the trestle and is loaded from there into wagons or trucks.

At the end of the sand flume is another box, into which the water discharges. This product is sold as fine asphalt sand. The overflowing water from the box seeps through the gravel and is used for washing purposes again.

The screening plant is equipped with 10 loading spouts for car loading purposes and 5 for truck and wagon loading. The company built a one mile switch track to the plant and they can ship their products over

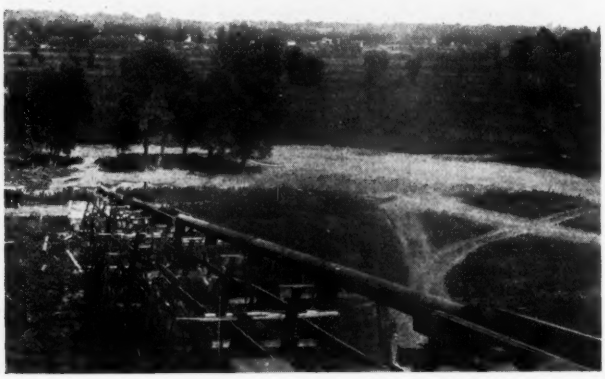




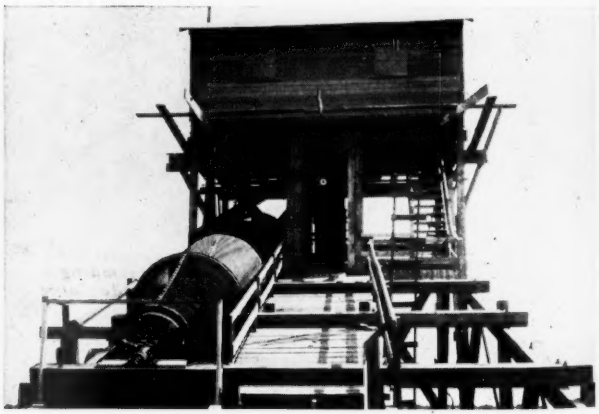
The pipe line from the dredge enters from the left in the upper illustration, discharges to the sump, and from there gravel is raised by the dredging and main elevators shown to the screens. Specially-constructed buckets on the dredging elevator are shown in detail in the lower illustration; alternate lips protrude to do the digging, while the other lips recede



The entire plant is electrically operated. This building houses the transformers and main oil switch

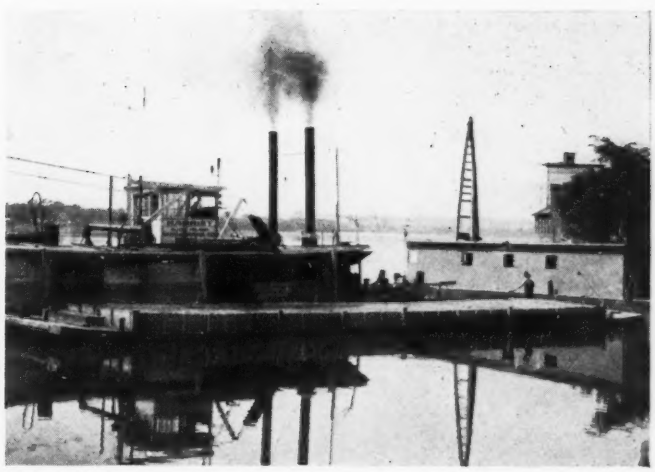


When sand bins are full sections of this discharge flume can be removed and gravity screens inserted to deposit sand on ground storage piles



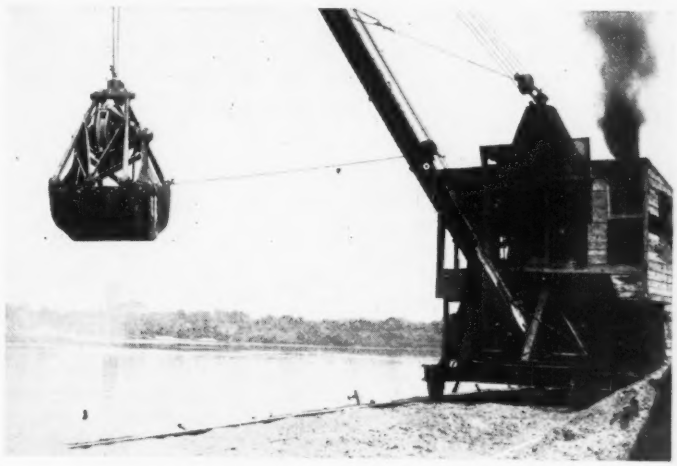
This set of conical washing screens at the left can be duplicated by a similar set placed at the right if an increase in screening capacity is desired





The "Harriet" used to pump sand from the Mississippi, but she has been superseded by dredges of later type and now she is used for towing purposes only









Here are four views of shipping methods in use. Upper left is a 7-yd. bunker made from an old boiler; to the right of it is a "home-made" crane for unloading barges; the 500-yd. steel bunker at the lower left is on the river front and used for wagon and truck trade; at the lower right is one of the car pullers used in spotting cars for loading from the bins

the Chicago Rock Island and Pacific Railroad. The track facilities at the plant for storage purposes are excellent, there being space for 20 loaded cars and 20 empty cars. Two Mead-Morrison electric car pullers are provided for spotting purposes. The average capacity of the plant is 1,000 yd. of sand and gravel per 10-hr. day.

The plant is entirely electrically operated, the total power consumption being 320 hp. This includes the car pullers. The power is bought from a local power company and enters a set of three transformers at 4800 v. It is reduced to 440-v., 60-cycle, 3-phase system.

In the sub-station is located the main switch, a circuit breaker which governs all equipment. Separate oil switches are provided for operating the pump boat, the screens and main elevators, and the deep well pump and dredging elevator. This is all General Electric equipment.

The Rock Island Sand and Gravel Co. was organized in 1902 and for 20 years it has been producing sand and gravel as well as engaging in general building material business. The company formerly pumped all of its sand from the Mississippi river and at the present time it has a four-boat barge line. The pumping of sand from the Mississippi will be entirely discontinued after the operation of the new plant is well under way. The product of the new plant is very much superior to that generally taken out of the Mississippi river. This company will ship within a radius of 100 miles.

The new plant was not built in a day or in a week but is the result of several years of study made by the executives of the Rock Island Sand and Gravel Co. The men responsible for this progress are C. J. Larkin, president; George H. Richmond, vice-president; William H. McConohie, treasurer; and H. J. Larkin, secretary and general manager. W. H. K. Bennett, Chicago, designed the sand dredge and supplied the equipment.

Making the Plant Fireproof

By J. F. Cameron
The Ontario Gypsum Co., Ltd.

Here, rather oddly, is a lime plant constructed of gypsum. At least gypsum in large quantities has been used to cover walls, floors, and roofs of the wooden frame to make it fireproof. Perhaps you can save insurance premiums as this company does by covering your wooden buildings

ON May 24, 1920, just at a time when our lime plant at Elora, Ontario, was running to full capacity, and we had orders booked for three or four months' business, it burned to the ground. As in the case of all fires of such character, it is an impossibility to estimate the loss sustained. We were fairly well covered by insurance, but we lost a tremendous amount of business and the building trade in general suffered as there was a boom on at that time and consequently contractors could not secure good lime in sufficient quantity to "carry on."

We immediately decided to rebuild, but made up our minds that the new lime plant would not be "built to burn."

We erected on the site of the old plant a fireproof building and we are now assured against further fire losses. The main mill building and warehouses were put up of wooden frame on concrete foundation. We then covered this frame inside and outside with gypsum plaster board and treated the roof, floors, bins, and every exposed part in the same manner.

The main building is approximately 50 by 50 ft., three stories in height. The warehouse is two stories in height, 40 ft. wide by 120 ft. long.

The exterior walls of the building were constructed on the following specifications: ⅜-in. gypsum plaster board was nailed direct to the studding and over this was laid heavy poultry netting stapled to the board. Over this we applied two coats of pulpstone

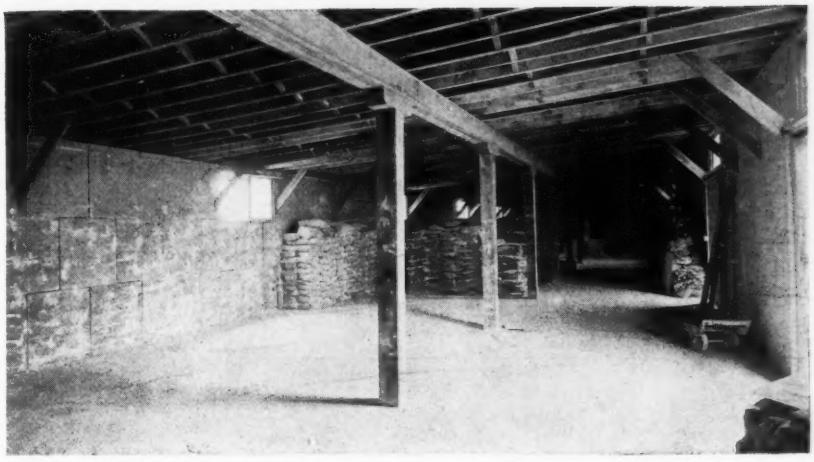


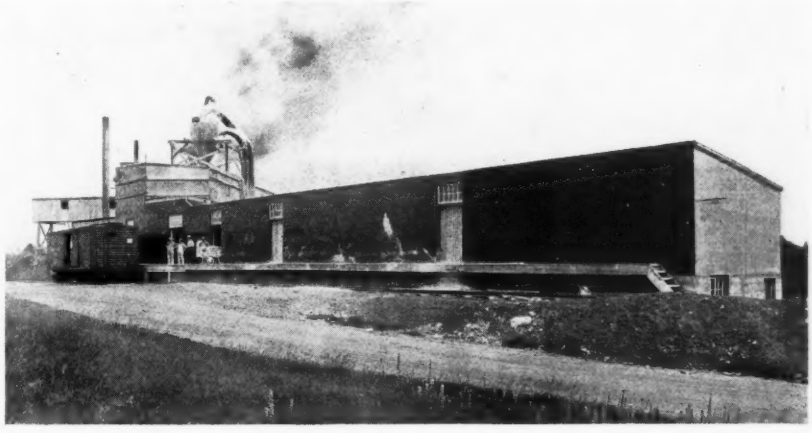
MADE OF GYPSUM; PRODUCING LIME

When the original plant burned in 1920 at a time when orders for lime were booked ahead for three months, the company wisely decided on a fireproof plant to replace the old one, and this is it

hardwall plaster and troweled it smooth. This was then treated with a waterproof oil paint.

The roof was constructed in the same manner, except that a built-up roofing was applied on top of the plaster. The floors were built up of ⅜-in gypsum plaster board laid on top of the floor joists, No. 9 heavy reinforcing wire was then placed on top of the gypsum plaster board, and the whole floor was given a 2-in. coat of pulpstone hardwall plaster troweled smooth. Where we have occasion to do a lot of heavy trucking, such as from the packer to the cars and back into the warehouse to the storage pile, we used steel filings in the finish coat, or put down steel plates for a runway. The bins were built in the same manner. Plaster board was put on the inside and outside and it was all given a coat of hardwall plaster troweled perfectly smooth. All the exposed joists and beams were covered with plaster board and plastered.





These views of the storage shed, inside and out, show how the frame construction has been made fireproof with the use of gypsum

This proved to be a very economical and perfectly satisfactory method of fireproofing wood frame construction, and after two years we are perfectly satisfied with the result. The exterior walls show no sign of deterioration or failure of any kind and the floors are standing up perfectly. We had hydrated lime stored in our warehouse during the past two winters and the dead load was 450 lb. per sq. ft.

There is a good deal of machinery installed in the building, of course,—motors, Raymond mills, Schaffer hydrator, and so on, and naturally there would be a certain amount of vibration, but until now this vibration has had no appreciable effect on the building and no cracks have developed.

This mill has been examined on a good many occasions by men who have the opportunity of seeing every lime plant in the country and we have been repeatedly congratulated on the neatness of the appearance, on the absence of dust and on the fireproof character of the mill.



On the wooden frame construction—built on concrete foundation—gypsum plaster board and hardwall plaster have been added to roofs, floors, and walls inside and out, giving a fireproof plant which fully satisfies the company after two years of use

It might be interesting just at this point to say that we do not carry any insurance on this building whatever and as a consequence save bank interest on the total cost of the building. Not only is there a large money saving, however, in a construction of this character, but there is the elimination of the constant fear of fire.

This company had a fair knowledge of the ability of such floors as constructed at Elora to withstand wear and tear. We had floors laid down at Paris, Ontario, some three and a half years ago which have stood up under hard wearing conditions and today are just as good as when they were put down.

We have had tests made by the Bureau of Standards in Washington, D. C., and found that the strength in tension and compression was sufficiently great to be practical for factory and warehouse use, providing sufficient reinforcement was utilized.

The joists in the floor are placed on 12-in. centers and the studding on the exterior wall 16-in. centers, rafters 12-in. centers.

Hints and Helps for Superintendents

Saving $600 on a Welding Outfit

EVERY quarry operator knows that he can make his plant more effective if he has at hand the means for quick repairs by welding which will prevent any breakdown from being a long one. Especially where a plant is located far from a city or place where there are welding facilities, such an outfit is more or less necessary to insure continuous operation.

The trouble too frequently is that the manager feels the expense involved may be too great to justify the purchase of a complete electric welding equipment for the occasional use which it will receive. The General Crushed Stone Co., at Le Roy, N. Y., overcame this difficulty by taking advantage of a smash-up of one of its trucks.

The car itself was demolished but the engine was unharmed, and this engine was mounted on an old wagon truck as shown in the illustration and the generator of an electric welding outfit was purchased and connected to the engine. This gives the company a welding unit which can be hauled in short order to any part of the plant for repairing breaks which may occur, and with it and the acetylene welding equipment which the company has, there are few equipment breaks now which can keep the plant out of operation for long.

The acetylene welding outfit is best for cast iron breaks, while the electric welder will make a stronger job than the acetylene on steel and malleable iron.

The engine from the wrecked car used in this case was of little commercial value, but it serves the purpose excellently on the welding outfit and saved the company at least $600 on its complete electric welding equipment. An employe of the company attended the welder manufacturer's free school for operators at the factory and soon became an expert welder.



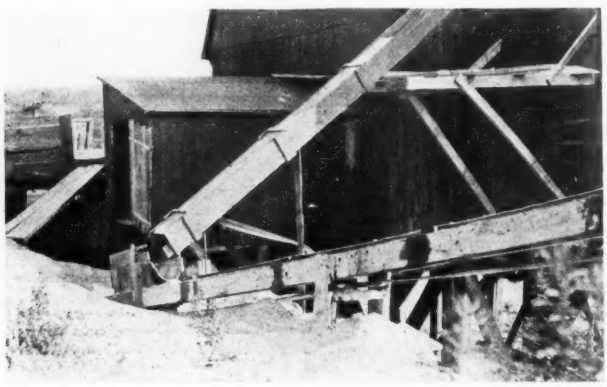
The automobile engine salvaged from a wreck drives the welding generator, and the whole forms a portable welding outfit the cost of which is low

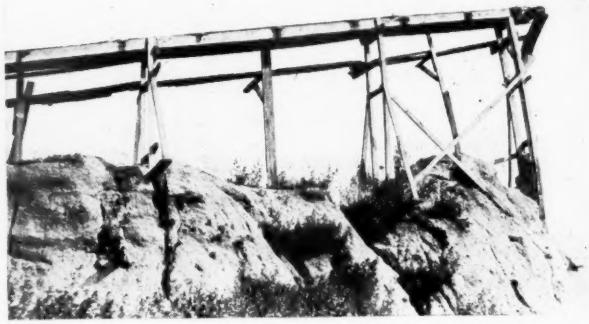
Getting Rid of the Fines

WHERE there is no market for the screenings of a crushed stone plant the disposition of this material is often troublesome. Some plants haul it off and dump it by means of teams and trucks but this is an expensive method, as is the method of building new and costly conveyors to carry the material to a dump pile.

At the C. B. Whitmore Co.'s plant at Lockport, N. Y., a worn-out belt and conveyor have been erected inexpensively outside the plant and the screenings are carried by this to a pile which is in the direction of a downward sloping hill. This conveyor extends about 80 ft. from the plant now and at this point the slope of the hill is sufficient to make an addition to the length of the conveyor unnecessary for several years, at the annual rate of output of this plant of 10,000 tons.

The illustrations show how the screenings are chuted out from the screen house at the foot of the conveyor and carried by the belt to the end of the pile and dumped off. A belt from the main con-





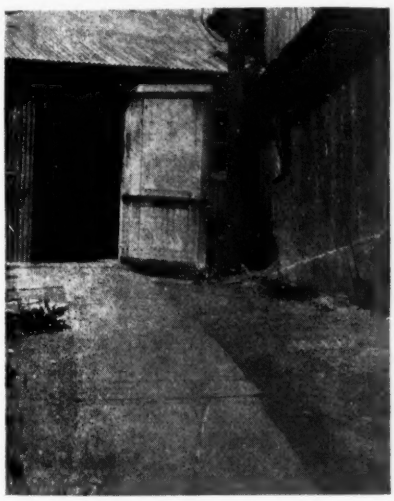
An old conveyor and belt no longer fit for service in the plant serves the purpose excellently in carrying screenings to the dump pile. There is practically no expense, either for initial investment or power to drive it

veyor with a driving pulley on this waste material belt takes care of the motive power for the belt.

Sidewalks from Junk

WHAT to do with old conveyer belts? Too often they are discarded as useless junk as soon as they are so worn that they no longer serve satisfactorily in their original capacity.

An Eastern crushed stone plant has found a use for some of its old belting in which the discarded material serves very well. This is for sidewalk material over spots which are frequently wet, muddy and slippery. There are always many places around a quarry, pit, or other part of the plant where men are obliged frequently to walk and the old belting merely laid on the ground serves to keep shoes clean and dry and their owners in a happier mood by protecting them from the naturally muddy condition of these places. The illustration shows how a 36-in. belt has been used at the plant referred to. Narrower belts are just as useful in this capacity. Where there is not much traffic a single

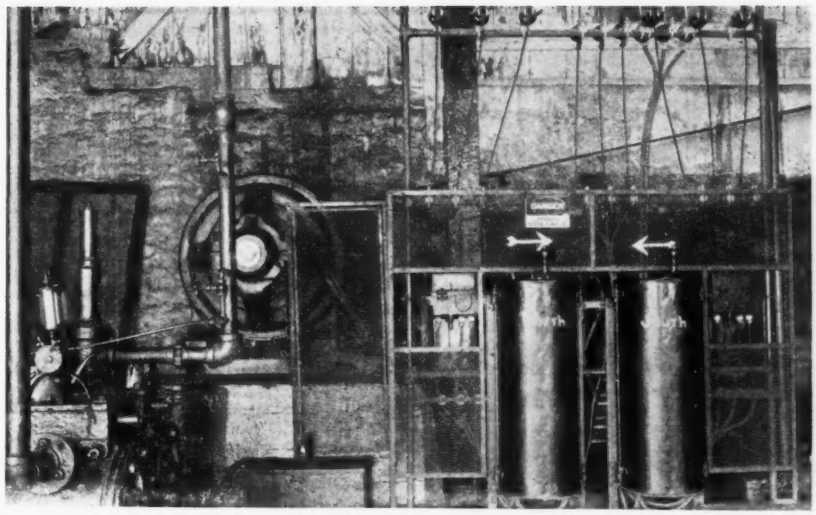


Laying sidewalks like this that "stay put" is only the work of a moment, and their cost never shows on the books

width of 24-in. belting is sufficient, and when desirable narrower belts can be laid double width.

A Clean Plant Pays

NEATNESS and orderliness always pay big dividends. A clean and well-kept plant produces a more favorable impression on any visitors who may come to it, much less time is lost looking for materials, tools, and equipment, the number of accidents is materially reduced, and the spirit and ambition of the workman is improved when the plant is well kept. Such a condition does not cost any more—in fact, it really costs less—than the dirty, cluttered-up condition in which some plants occasionally find themselves.



A safe plant, as well as a clean one, is this where woven wire guards, conduits for electrical wires, danger signals, and safe operating instructions are all plainly and neatly marked

A sample of the well-kept plant is shown in the illustration of a corner in the Pittsburgh Plate Glass Co.'s Ford City, Pa., glass sand plant. All the material, machinery, and equipment is clean and bright; the wires are all in approved conduits; the electrical switches are carefully protected by neat wire screens; the danger sign is neatly printed and effectively placed; the electrical controls are labeled so that there can be no possibility of error, and the direction of throw of the handles is indicated by arrows mounted on a screen behind the controllers.

Stone, cement and other plants in the rock products industries where there are continuously large quantities of dust are more difficult to clean than the average plant, yet the expense of janitor work to maintain a high degree of cleanliness is ordinarily more than made up for in the increased production which the employes are enabled and inspired to give.

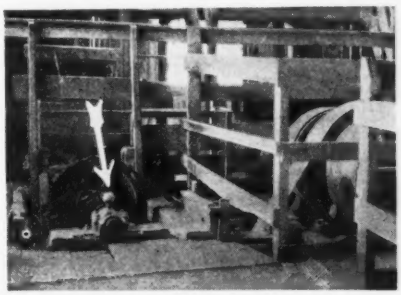
Where Oil Replaces Grease

GREASE cups for the lubrication of shafting are commonly used, but there are some disadvantages such as hardening of the grease, the bother of filling the cups, the greater likelihood of dirt and grit getting into the lubricant and so on, which operators of machinery recognize. The substitution of an oil cup such as the one shown in the illustration is working well at the plant where this has been done. The oil cup is easily filled and a small wick from the cup through the bearings and down to the shaft gives a contiuuous small volume of lubricant to the bearing which is just sufficient to keep it properly oiled. Less attention is required for the oil cup; there is no need for regularly screwing down the cap of the grease cups so as to force the grease down to the shaft and it is only necessary to fill the cup with oil as the cup gets empty.

Besides, the oil cup is dust and grit proof and is a better method of lubrication, everything considered, where dust and grit are encountered.

Care and Maintenance of Excavating Machinery

DECLARING its intention of publishing a series of articles on the care and maintenance of excavating, the *Excavating Engineer* for August has this to say:



The oil cup which the arrow points out works more satisfactorily than the grease cup it replaces

There is probably no class of machinery built with greater ruggedness and strength throughout than is excavating machinery. One of the principal reasons for this is the fact that on the general run of excavation work, unless the machine is kept working steadily, material cannot be moved at a low cost. It is the first duty, therefore, of

any operator to keep his machine in repair.

The high grade, experienced operators have no hard and fast rule for the time of shutting down a machine for repairs except that a machine should not be run if there are repairs needed, which, if not made promptly, are likely to cause further and serious damage. However, if there are minor repairs or changes which will improve the operation of the machine, the operator will endeavor to run until nearly lunch hour or quitting time and then make them. An experienced operator will never shut his machine down when it is really not necessary, but always does shut it down promptly when it needs immediate attention. This is a matter of good judgment which the operator has gained by experience and study. His judgment regarding this matter governs to a great extent the yardage moved.

Certain parts of the machine which are not functioning properly will come or be called to the attention of the operator or person in charge. Even an experienced man may try several times to correct the trouble without success. Such a man would then advise the superintendent or general foreman and request his opinion as to what should be done. Under no circumstances would he neglect this matter until the condition became such that the machine would have to shut down for making general repairs.

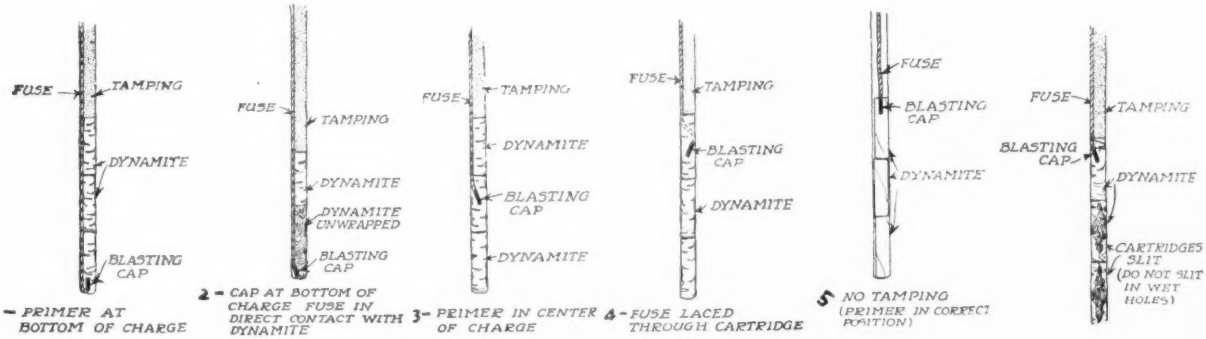
An experienced operator generally makes all the necessary adjustments and repairs to the moving parts, and also at regular intervals inspects the permanent connections of the structural parts and castings. He realizes the importance of keeping the moving parts working properly, also the equally important factor that the various bolts and rivets holding the structural members and castings in position be kept tight.

The operator makes his inspection at regular intervals—at least once or twice a month on days when the machine is idle; and if any bolts are found loose they are tightened, or if any rivets are loose they are cut out and re-driven. These points are carefully looked after when the machine is assembled to insure well-connected members.

The appearance of his machine is a matter of pride with the experienced operator. He instructs his crew that the floors and machinery must be kept free from oil or dirt which may drip from the bearings, gears or ropes.

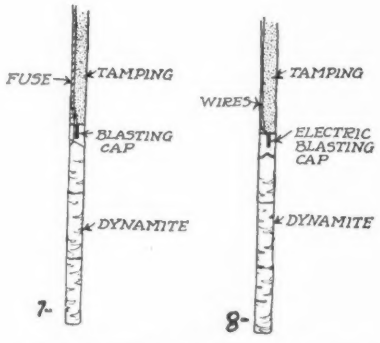
Other rules enforced by the operator are: Repair work must always be done in the proper way—slipshod methods are more expensive in the end; when the repairs are completed, tools and equipment should be placed in their racks and kept clean and orderly. The machine in general, condition of the fire and water, as well as the position of the shovel and condition of pit, must be left so as to aid the operators on the night shift.

He finds it advisable to paint that portion of the machine which is exposed to the weather once every year or two to prevent deterioration of the iron or wood. Such painting will improve the appearance of the machine. The first impression a visitor obtains of a neat-appearing machine is that the work is being carried on in a systematic and economical way and that the operator is a high grade, efficient man.



SIX INCORRECT WAYS OF LOADING DYNAMITE

1—The cap with fuse should NOT be placed at the bottom of the hole like this, as the side spit of the fuse would be likely to set fire to the dynamite. 2—This is bad practice, as the cap is pointed AWAY from the charge instead of toward it, and the fuse is also likely to set fire to the dynamite before the cap explodes. 3—The middle of the charge is not the right place to put the primer as the top cartridge does not receive the full force of the cap and the fuse may ignite the powder which touches it. 4—Lacing the fuse through the priming cartridge is bad practice. It nearly always lets the fuse side spit into the dynamite. 5—This kind of loading, without tamping, is expensive and inefficient, as the top cartridge wastes most of its force blowing out the hole. Tamping increases the effectiveness of high explosives enormously. 6—If the holes are full of water the cartridges of dynamite should not be slit, as water affects nearly every kind of dynamite except gelatin



TWO WAYS BRINGING MAXIMUM RESULTS

7—This way, with the cap in the top of the top cartridge, pointing down toward the bulk of the charge, with lots of tamping and no part of the fuse touching the powder, will give a perfect shot every time. 8—Fired electrically, the best results will be had this way, as the blasting cap is placed so as to exert its maximum detonating effect on all the explosive in the charge

How and How Not to Load Dynamite

IN a set of instructions recently prepared by Arthur La Motte, chief of the technical bureau of E. I. du Pont de Nemours & Co., are given methods of correct loading of dynamite and showing the most efficient manner of preparing the explosive for work. The illustrations also show certain incorrect practices actually in use.

In large blasting operations, it is extremely important that special attention be given to the preparation of the detonator for the explosive charges. A misfire in such operations is a serious and dangerous matter. Although the subject of loading dynamite cartridges has been given attention for years, it has been found that some explosive users continue to use incorrect methods, thus not only creating what may develop into dangerous conditions, but actually losing money by the failure to get the most efficient results from the use of dynamite.

In the accompanying illustrations are shown six wrong ways of loading dynamite and two right ways.

Will There Be Cars?

Producers Reflect Conditions in the Country Due to Coal and Car Shortages, and Show the Need for Prompt Relief

THE end of the bituminous coal strike means no immediate relief for most of the rock products industries. In fact, it is the real beginning of trouble for aggregate producers who depend on open top cars to make their shipments, for with the priorities order of the interstate commerce commission in effect and coal shipments resuming, all available open top cars are likely to be sent to the mines to the almost total exclusion of other industries depending on this means of transportation. With the rail situation still unsettled, more cars going into the bad order class every day, and back shipments piling up in many places because of insufficient equipment or the refusal of train crews to work, the situation is still far from being one to rejoice over.

Up to the present time many plants have been unaffected or practically so by the two big strikes, but more plants are continually reporting that they are beginning to feel the effects of the coal and car shortages due to the strikes and the priorities order.

Late Reports from Producers

Reports as of Wednesday of this week—in the form of telegrams from a number of representative producers to ROCK PRODUCTS—indicate the growing effect of these conditions. Some plants have already been closed for some time; at others the output or the shipments have been greatly reduced due either to lack of coal or cars; while still others are just feeling the effects. Every report showed that the plant in question either had been affected or expected soon to be.

A Virginia crushed stone producer's plants have all been closed since August 5 because of the priorities order; an Iowa portland cement plant has been down since July 12 for the lack of coal; an Alabama slag plant has not been operating since August 1 due to the priorities order; a Missouri lime and cement company reports no serious effect on output west of the Missouri river, because of coal shortage but says that lack of cars has seriously affected shipments. The output of one large central producer has been reduced during July and August 40 per cent from June and 20 per cent from May.

On the other hand, an Illinois sand and gravel operator has felt the effects so far only slightly; one New Jersey producer is just beginning to feel them, while another says, "No effect so far;" and other plants mention no effect up to the present, but predict early and serious results to their business from the present outlook. One Connecticut producer of aggregates is fortunate in shipping by trolley freight, so unless the trolley company's power supply is affected the plant will run into no shipping difficulties.

The telegrams point out the growing seriousness of the situation and suggest what results are likely to follow if relief is not soon afforded. That a serious car shortage is due is nearly everywhere recognized. A large amount of business on the books of many producers will have to be cancelled if coal and cars are not made available, and it appears that in many cases they will not be available in sufficient quantities and quickly enough to handle the products at the time they are needed on the waiting jobs.

Much highway and other construction work will be held up, contractors will suffer serious financial losses, and "it will mean mighty near bankruptcy for stone producers" unless immediate relief is given. These are views expressed by producers of rock products in various parts of the country.

Little Winter Construction

Suggestions have been made that delays in construction programs during the coming few weeks will mean that construction will continue into the winter longer than usual and that the net result will be approximately the same. To a degree this doubtless will be true, but producers are putting little faith in it as an additional source of business; weather conditions do not favor such a result. The Iowa cement plant which has been closed for six weeks expects to operate all winter if coal and transportation conditions permit, but aggregate producers are hampered by snow and ice covering their deposits, by freezing of the materials in handling and grading, and even when shipments are made from previously prepared storage piles freezing during shipment in open-top cars makes the handling difficult and keeps the trade small. Besides, the demand for use in concrete is limited because concrete made in freezing weather involves greater care and expense and is less likely to give satisfactory results.

A better idea of the situation is gained from the actual telegrams received by ROCK PRODUCTS during the past week. Some of the representative ones follow:

Coal shortage and priorities orders have had no effect on our shipments. Delays during next two months will carry construction period into December. Do not expect larger winter demand than usual, and expect to make winter shipments from storage piles as usual.—Hugh Haddow, Jr., Menantico Sand and Gravel Co., Millville, N. J.

About a month's supply of coal on hand. Present shipments mostly for road building purposes. Just beginning to feel car shortage. Result would be great financial loss to road contractors, as work that should be done this fall would be deferred until spring for concrete cannot be laid in winter weather in this territory. Look for very little winter work, as winter work is mostly industrial work, which is practically at a standstill here.—F. R. Upton, Inc., Newark, N. J.

So far priority order has hurt us but slightly. However, we expect drastic changes daily. We look for 50 per cent car supply with various restrictions as to movement of cars. We do not have stock piles and do not prepare for winter loading.—H. D. Conkey and Co., Mendota, Ill.

Conditions are so upset that we cannot predict the outcome. Believe there will be sufficient coal for all. Practically no winter aggregate business in this territory. With plentiful coal supply there will be serious shortage of open cars and box cars to lesser extent.—American Lime and Stone Co., Bellefonte, Pa.

Our plant closed down since July 12 account lack of coal. No priorities in effect west of Mississippi river. Expect to operate our plant all winter.—Hawkeye Portland Cement Co., Des Moines, Iowa.

Coal shortage has not thus far seriously affected output of mills west of Missouri river. Shipments are seriously affected by car shortage from which no early relief promised. Extent our winter demand will depend upon whether conditions car supply for aggregates and amount of uncompleted work, since comparatively little new work is usually begun during winter season.—L. T. Sunderland, president, Ashgrove Lime and Portland Cement Co., Kansas City, Mo.

Coal shortage serious—10 days' supply

on hand. Heavy stone tonnage booked but will be cancelled unless coal becomes available. Winter demand will not be increased, by reason of present shortage of coal. Winter demand does not justify operating of plants.—Bettendorf Stone Co., Davenport, Ia.

Transportation difficulties have reduced our output in July and August about 40 per cent from June, and 20 per cent from May. We ship only from storage during freezing weather in such cars as are available.—W. P. Carmichael, St. Louis, Mo.

Our plant shut down since August 1 account priority order. Settlement coal strike may relieve us some. Expect good many orders to be cancelled unless we are able to resume early date. Expect normal winter demand provided service order cancelled or modified to permit resumption construction work.—Birmingham Slag Co., Birmingham, Ala.

Our output is handled by trolley freight and truck. Plant operated by electric power so that coal shortage and priorities do not directly affect us. Should the local trolley and electric light companies be affected, it would in turn reduce our operations.—Edward Balf Co., Hartford, Conn.

All our plants down since August 5 absolutely account priority order. If not furnished adequate car supply for fall months will mean stopping of great deal of highway work, concrete work, and largely prohibit Norfolk and Western from getting their normal amount ballast for tracks. We can do but little in crushed stone business here after December 1. Our winters are generally too cold for ballasting track or laying any kind concrete for structures or highways. Lastly it will mean mighty near bankruptcy for stone producers unless immediate relief is given.—W. W. Boxley, Roanoke, Va.

Our shipments not yet interfered with by coal situation. Railroad strike is interfering seriously. Expect decreased shipments next two months which to some extent will be made up in winter. Freezing weather will not interfere with shipping aggregates but may interfere with concrete work. Coal shortage and priorities may put us out of business in six weeks.—Loring A. Cover, President, Security Cement & Lime Co., Baltimore, Md.

Believes Coal Situation Not Serious

Coal shortage and priorities order have not affected our car supply or shipments at all as yet. Do not expect and are not preparing for larger than normal winter demand. Winter shipments loaded from stock pile using locomotive crane. Ship in open top cars. Coal offered today at $6 at mines—supply ample, price going down. Believe coal situation less serious than you apparently think. There has been no time this year when we could not obtain coal.—Rock Cut Stone Co., Syracuse, N. Y.

Effects of coal shortage in priorities hardly perceptible now. Would be chaos in all lines during autumn. Three million in building permits city of St. Paul during August. Normal winter demand not being increased; not preparing for larger winter demand. Winter shipments taken care of by stock piling during dry weather and reloading for shipment.—J. L. Shiely Co., St. Paul, Minn.

The priority order closed us down two days this week on account of the railroad company taking coal that was consigned to us and ready for delivery to our plant. This car shortage has not given us any inconvenience this season so far, but we anticipate that it will be necessary for us to shut down almost indefinitely when the strike on the railroad is over and the miners are working 100 per cent, as we feel that we will be allowed only the low sided cars and we are unfortunately located on a railroad that does a heavy coal business and operate but a few low side cars of their own. We do not have occasion to protect our shipments in the extreme weather from freezing, as we find that with the first real cold spell all the contractors usually discontinue operation for the season.—G. M. Evans, Monon Crushed Stone Co., Monon, Ind.

We may be affected probably only by the shortage of cement in Columbus resulting from coal scarcity at the cement mills. Most of our shipments are by trucks in and around Columbus. However, we would feel the cement shortage in the consumption of our product.—The Arrow Sand Co., S. Neal Hallock, President.

Will Operate During Winter

There will unquestionably be a serious car shortage when the mines fully resume operations. A great many cars are now out of service and we have about 3 per cent of loads set out on siding account of bad order. We usually operate during the winter and anticipate the demand will justify doing so this year. Account of the close margin on which crushed stone is sold we believe tarpaulins for covering shipments would be prohibitive in cost. We have not in the past experienced any serious trouble with material freezing and expect to ship the winter through in usual manner.—W. S. Charles, The Charles Stone Co., Marion, Ill.

No Winter Highway Construction

Leon C. Herrick, director of highways for the state of Ohio, is quoted in the *Columbus Journal* nearly three weeks ago as saying that state highway construction would stop in 10 days if cement, brick, and stone producers unless coal was speedily supplied. The Ohio director has been attemting to secure modifications of the priorities order to permit the continued construction of highways, but the following telegram received from him August 23 indicates no success so far:

We anticipate carrying on construction in such amount as conditions will permit as long as weather is suitable. We have been unable to secure any modifications of priorities order to our advantage.—Leon C. Herrick, Columbus, Ohio.

Other highway engineers indicate that there will be no winter demand for road materials, as the typical telegrams below show:

If coal and rail situation prevents shipment sufficient quantities cement and aggregate during fall, highway work will not be continued during winter. Coal shortage and car priority has caused shut down of some construction. Attempts have been made to have priority order amended to benefit aggregate shipments.—C. P. Fortney, chairman, State Road Commission, Charleston, W. Va.

We do not intend to continue laying pavement beyond the time that fresh construction may be damaged by frost action. Coal shortage and car priorities have had little effect so far. No attempt made to have car priorities order amended believing that importance of highway construction as compared with other industries has been carefully considered by the authorities issuing the order and that it will be accorded its proper place in view of existing conditions.—Herbert S. Sissons, New York State Commissioner of Highways, Albany, N. Y.

We cannot continue highway construction in the winter. in this climate. Car priorities have delayed somewhat shipment of cement and iron pipe from southern states. Coal shortage has not yet affected. No attempts yet made to have priorities order amended.—A. W. Dean, Boston, Mass.

Tennessee highway department contemplates continuing highway construction throughout year. Coal shortage and car priorities expected to delay our construction work somewhat, but not more than perhaps 15 or 20 per cent. Priority orders have been amended to permit shipment of aggregate in flat cars with sideboards, which can not be used for coal shipments.—D. Q. McComb, Chief Engineer, Nashville, Tenn.

Cannot continue highway construction into winter account impossibility of satisfactorily building concrete pavements in freezing weather. Have made attempts to have priority order amended to benefit aggregate shipments, no success.—Frank Sheets, Superintendent of Highways, Springfield, Ill.

What the Sand and Gravel Association Is Doing

Handling direct with the authorities specific car-shortage complaints; showing that aggregate shipments are not prohibited; ready to protest injustices; this summarizes the splendid service the association is rendering its members

THE following telegram from the acting secretary of the National Association of Sand and Gravel Producers indicates what the Washington office of the association has been doing up to noon of Friday, August 25:

Activities of past week devoted to handling specific complaints of car shortages of our numbers since service orders were issued. Have received 45 complaints, most of them being satisfactorily adjusted. We have handled each case directly with Interstate Commerce Commission, the American Railway Association and railroads concerned. Have secured issuance of specific instructions to carriers by railway association clarifying the orders and pointing out that priority orders do not operate to prohibit sand, gravel and stone shipments. In many instances where railroads have misinterpreted intent of orders have succeeded in bringing about more liberal attitude on their part toward moving our materials.

When union mines resume full operation next week sand, gravel and stone producers will undoubtedly suffer further curtailment of their car supply. Latest reports indicate 92 per cent car supply for sand, gravel and stone producers. We have positive advice from commission that orders will not be modified until injustices have been clearly shown. When situation becomes acute will ask for immediate hearing before commission. We are now preparing for this hearing.—T. R. Barrows, National Association Sand and Gravel Producers.

Effect of Strike Settlement

The supplement to the association's bulletin published a week earlier gives a more detailed estimate of the situation, as shown in the following quotations:

Resumption of operations in the bituminous fields will, no doubt, have the effect of still further curtailing car supply for sand, gravel and stone producers. When the mines resume operations the full force and effect of Service Order No. 23 will be felt in the entire territory east of the Mississippi river. Heretofore, only certain producers with plants located on railroads serving the non-union fields have been experiencing complete denial of empties for loading, but there is now occasion for concern as to whether the industry will be practically, and possibly completely, stopped because of the priority movement of coal.

Officials of the Interstate Commerce Commission are now completely gripped with the "coal hysteria" which we described in Bulletin Supplement No. 7 of June 29. Apparently, scant consideration will be given other industries, no matter how important their functioning may be to the country, in the mad rush to move coal, without regard to whether the coal is to be used in the prosecution of an essential or non-essential activity.

The hastily provised settlement reached between the bituminous operators and the miners, which will undoubtedly be followed shortly by a like agreement in the anthracite branch of the coal industry, seems to be a complete victory for the miners' union. Its only effect is to further postpone the inevitable show-down which must come between the operators and the miners.

If past experiences may be accepted as indicating the future, small hope can be entertained that the operators and the miners will reach a settlement of their controversies and thus avoid repetition of the 1922 strike. Accordingly, the sand, gravel and stone industry seems destined to be almost annually disrupted because of the inefficient and uneconomic conditions prevailing in the coal industry.

Our only hope for safeguarding the interests of the industry is to secure enactment of Senate Bill 690, removing the power of the Interstate Commerce Commission to issue priority orders. This would go farther than any other one thing in securing for the industry the consideration which it deserves.

Washington Conference of State Highway Officials

A committee of the Association of State Highway Officials met in Washington on Monday of this week (August 14) and conferred with Commissioner Aitchison regarding the effect of the priority orders on the road program of the country. It is understood that the committee was not greatly encouraged after their conference with the commissioner.

We are informed, though, that decision has been reached to delay the beginning of any new road projects but rather to devote efforts toward securing the completion of roads now in the process of construction. No program of action has been formulated for getting cars for moving materials to complete such roads, nor has any request been made of the Interstate Commerce Commission for devising a system of permits for preferred movement of road materials.

It has been concluded that the most effective way to secure cars for moving road materials is to handle the matter directly with the state authorities who are acting in conjunction with the federal authorities in directing the movement of coal. It is hoped that the state authorities will be willing to instruct the placement of empties for moving road materials after the most essential consumers of coal have been provided for.

According to the figures of the American Railway Association, the number of serviceable surplus open-top cars for the week ending July 31 was 131,267, which is a decrease over the preceding week of 10,163 cars. The substantial increase in coal loadings was undoubtedly due to the renewed activity in the non-union fields.

A comparison of the activity in the sand, gravel and stone industry for the years 1922 and 1920 as regards car loadings is of interest. Complete data along this line will be worked up later by the National Association. However, to take one week as an example we have discovered that a comparison of the loading of sand, gravel and stone for the week ending July 22, 1922, with the corresponding week of 1920 indicates that this year the total was 48,116 cars, while for the year 1920 the total was 28,703, which was only 48 per cent of the requirements.

Potash Bounty Defeated

THE proposal of the National Senate finance committee to substitute a bounty for the protective duties previously prescribed for potash was rejected by the Senate on August 8 by a vote of 30 to 32.

Modify Service Order 23

That is what many agencies are asking of the Interstate Commerce Commission is that open-top cars may be more justly and more reasonably distributed

APPEALS are being made to the Interstate Commerce Commission, both direct and through other agencies, to modify service order 23 so that aggregates and other materials needed in the national highway programs and in building construction generally may have preference over other materials in class 5 after the requirements for the first four classes have been filled. An excellent statement of the case has been made by the Wisconsin Mineral Aggregate Association which, on August 14, sent the letter copied below to each member of the Interstate Commerce Commission, to Senator Lenroot and each representative from Wisconsin; also the chairman of the Wisconsin Railroad Commission.

Dear Sir:

Under date of July 25, 1922, the Interstate Commerce Commission issued Service Order No. 23, declaring that an emergency existed, and instructed the railroads to discontinue the use of cars suitable for the loading and transportation of coal for the transportation of commodities other than coal so long as any coal mines remained to be served with such cars.

The effect of this order is nation-wide. There is not a shipper, either large or small, who will not feel this service order. Shipments will be curtailed, necessitating a decrease in production, thereby causing a reduction of operating force. Large users of open-top cars, such as shippers of sand, gravel and crushed stone, as represented in Wisconsin by the members of the Wisconsin Mineral Aggregate Association, will have to close their pits and quarries, causing the complete shut-down of federal aid, state and county highway programs and the building industry.

The Wisconsin Mineral Aggregate Association is an association composed of producers of sand, gravel and crushed stone, and its purpose is to promote and extend the uses of mineral aggregate by devising ways and means of conveying to the public the merits of the product; to create and extend cordial and friendly relations among the producers and users of mineral aggregate; to discourage unfair and unscrupulous business methods; to promote higher and better business ethics.

The members of this Association require at least a minimum of 500 open-top cars per day, to successfully conduct their business, 85 per cent of this number of cars being used in the construction of important federal aid, state and county highways.

The Wisconsin Mineral Aggregate Association recognizes the need for the equitable and proper distribution of coal to offset the hardships of the coming winter and the members would, if necessary, gladly close their plants indefinitely, if by doing so they could remedy or alleviate the possible suffering of the people, due to a shortage of coal for the homes or a general shut-down of essential manufactures; but, these coal shortages or crises are not new.

In 1920, we passed through a similar emergency. Embargoes were placed and priorities affected nearly every shipment. Service orders affecting, as they do, the entire shipping nation, should eliminate the repetition of past abuses of former service orders. It was brought out in 1920 that cars were denied to sand, gravel and crushed stone producers when mine tracks were congested with empty open-top cars due to the inability of the mines to load sufficient coal. The cars laid idle for many days and in the interim could have been usefully employed for the carrying of other commodities.

The car shortage for other commodities could be modified by using the open-top cars for loadings in the direction of the mines, and in this way, congestion at the mines would be partly avoided.

The sand, gravel and crushed stone industry was denied cars in 1920, while investigation showed that there were numerous idle cars at the railroad terminals and sidetracks.

The importance of the highway program can only be lightly touched upon, but at the present time there are 450 miles of federal aid, state and county highways under construction in Wisconsin. These are main arteries of travel serving over three millions of people, providing all year travel for over 400,000 auto trucks and pleasure cars, providing facilities for the transportation of food products from the farming communities to the cities.

Such an important industry as the sand, gravel and crushed stone producers, serving, as they do, the whole state, should be put in a higher priority class than the unessential industries such as toy manufacturing, piano manufacturing and like concerns who would come under class five.

Another point to be taken in consideration is that the sand, gravel and crushed stone producers rarely ship later than November 1, and this date is generally prior to the cold weather.

Under class five of service order No. 23, there are no restrictions as to the reconsignment of coal, as this class represents a large portion of the coal consumers. Numerous open-top cars could be tied up indefinitely by diversion and reconsignment and it is impossible to say just what would happen as to price speculation due to lack of restriction applicable to this class. It is a fact that in 1920 speculative coal companies were very prominent in the coal industry.

During 1920, all open-top cars were removed from Wisconsin and sent to the coal-mining states. Due to congestion and over-supply of cars to the mines, these cars, regardless of the embargo which prohibited industries in Wisconsin from using them, were actually being used by similar industries of the coal-producing states.

From experience with the similar order of 1920, it is evident that if the proper distribution of cars had been made, that the sand, gravel and crushed stone industry could have been served and sufficient cars given to the mines to relieve the coal shortage, and we pray you that this service order No. 23 be so modified that this industry will be permitted to have open-top cars after the four classes enumerated have been supplied.

Soapstone Found in Ontario

A DISCOVERY of much interest to heating engineers and manufacturers of heating equipment is that of a new source of soapstone at Wabigoon, near Dryden, Ontario. There is a large body of soapstone there and very little overburden. The stone is soft enough to cut readily with an ordinary saw. It is a dark greenish-grey rock, composed largely of talc and is very similar in appearance and composition to the so-called "alberene stone" of Virginia.—*Domestic Engineering.*

I. C. C. Will Hear A. G. C.

AS a result of the petition requesting a revision of the present priority orders sent to the Interstate Commerce Commission on August 5, it was announced that a hearing would be granted to a representative of the A. G. C. on August 25 and that General Marshall would represent the A. G. C.

A letter was sent to all chapter secretaries, reports the *News-Letter* of the Associated General Contractors, calling their attention to the A. G. C. petition and suggesting that they place a copy of it in the hands of the freight departments of the various railroads centering in their cities. This was to impress and educate them as to the statistics submitted with the petition, as was done by John Williams, secretary of the Nashville chapter.

While protests are going in to the commission, the attention of members is called to the fact that Service Order No. 23 does not preclude the use of open-top cars for the shipment of construction materials if there are any available after they have been furnished for the transportation of coal.

Building Revival Helps U. S. Gypsum

THE widespread revival in the building industry during the first half of this year, caused a material expansion in the net income reported for that period by the United States Gypsum Co. The total earnings for the six months ended June 30, 1922, were $1,797,826, compared with $1,319,242 for the same period in 1921.

Net income was $1,246,859, against $868,218 in the previous year. After preferred dividends there was available for the $4,172,149, par $20, common stock outstanding, $1,037,962, or at the rate of $4.98 a share. This compares with $3.16 a share earned in the first half-year of 1921. Total amount carried to the surplus account for the period was $995,704, compared with $610,147 last year.

Don't Miss This Convention

EVERY rock products producer will find much to interest and instruct him at the 25th annual convention of the American Mining Congress to be held in Cleveland, October 9 to 14. More than 100 exhibitors of mining and quarrying machinery and equipment have already made their plans to have space at the convention, and such products as electric, steam and gasoline locomotives, pumps, screens, explosives, cars, shovels, scoops, safety equipment, welding apparatus, wire and steel products and all sorts of power, electrical and industrial machinery will be exhibited. Last year Rock Products had a booth at this exposition and it will have a booth again this year, at which all members of the rock products industries will be heartily welcome.

Collections of various non-metallic minerals and photographs depicting the mining and manufacturing of these minerals and showing their importance will be exhibited at the Rock Products booth.

Meeting of Indiana Executive Committee

THE executive committee of the Indiana Sand and Gravel Producers Association held a meeting at Indianapolis on August 3 and discussed matters of importance. The report of E. Guy Sutton of the Carmichael Gravel Co., in reference to car supply, was read and adopted. Mr. Sutton had spent several days in Washington securing the first-hand information embodied in his report.

Those present at the meeting were: M. A. Neville, J. A. Shearer, H. C. Huffstetter, D. R. Snyder, representing Abe Hart, E. Guy Sutton and R. C. Yeoman.

Philippines Wants Cement and Other Building Materials

CONFIDENTIAL information comes to Rock Products that there are specific inquiries in the Philippines for cement and building materials.

To get the detailed information it is necessary only for American exporters to apply to the nearest office of the Bureau of Foreign and Domestic Commerce, Washington, D. C., giving the number of this inquiry, 3379.

Will Establish Engineering Museum

PLANS for the establishment of a national engineering museum, the first of the kind in the United States, are announced by the American Society of Mechanical Engineers. The collection, which will be part of the Smithsonian Institution's National Museum at Washington, will be started with models, drawings, diplomas and medals that once belonged to Captain John Ericcson and Cornelius H. DeLamater, buliders of the Monitor, and the pioneer engineers of America.

All the engineering societies in America have accepted the Mechanical Engineering Society's invitation to participate in assembling material for the museum.

New Canadian Cement Plant

THE contract for engineering work on the 3000-bbl. cement plant to be erected by the Dominion Portland Cement Co. at Montreal has been given to Richard K. Meads of Baltimore. The plant will use the dry process and it is expected now that construction will start in about a month.

"Sore and Disgusted"

THERE are no "ifs" and "ands" about it. The coal and rail situations do prevent the shipment of cement and aggregate and will continue to prevent them until it is far beyond the time when it will do our state highway program any material good. We are getting just about one-fourth of the cement needed to keep our jobs in operation, and this supply even is rapidly being cut off. We see no hope for any material benefit from any developments which may now ensue.

We have no expectation of continuing work into the winter on concrete highways. It cannot be done in this climate regardless of what some of the half-baked idiots seem to think. The jobs which are being shut down are being shut down for the year, and they will stay shut down until there is some chance of supplying them so that they can be built with economy and fairness to the contractors.

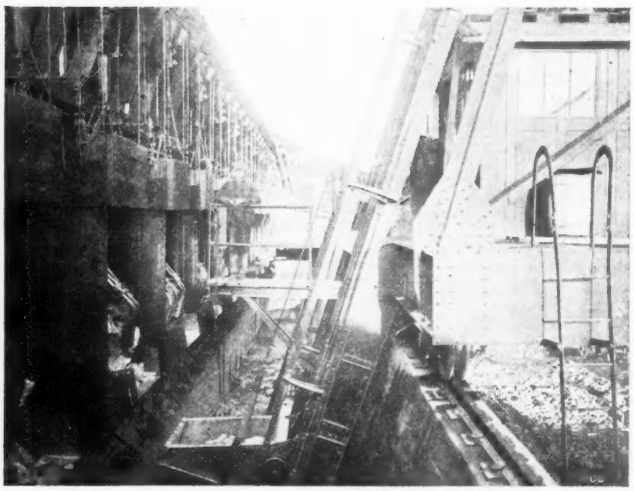
We have made no effort to secure car priorities for the shipment of aggregate. We assume that, just as heretofore, open-top cars will sail past our doors to stand on the sidings in Illinois until they are covered with weeds. The people are going to demand coal, and the sight of any open-top car loaded with anything else is going to be like a red flag to a bull, despite the fact that a very reasonable use of such cars will not interfere with coal movements.

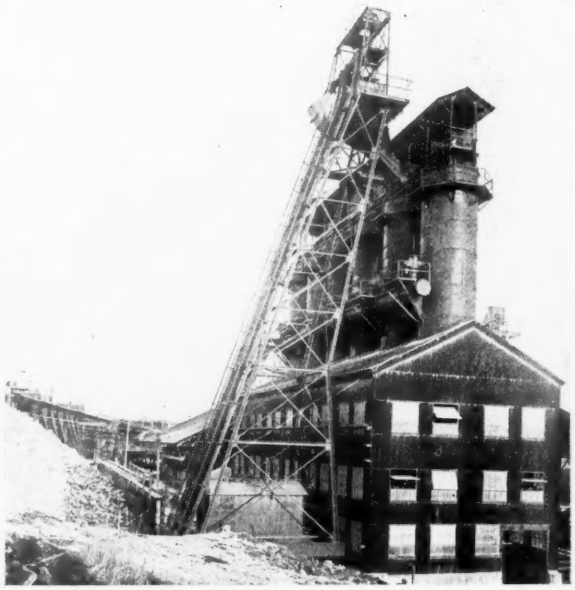
It is, however, entirely too much to expect that either the federal authorities in charge of rail movements or the railroad men themselves will give any consideration to the construction industry. The bitter experience of the seven years past has convinced us of that fact. They are glad to accept the revenues from the construction industry whenever there is nothing else offered, but they much prefer to carry anything else in the world rather than construction materials at any other time.

As you may judge from the above, we are sore and disgusted with the national administration, the national management of the coal and rail strikes and the perpetual period of distress which the construction industry is forced to stand always almost alone.—A. R. Hirst, State Highway Engineer, Wisconsin Highway Commission.

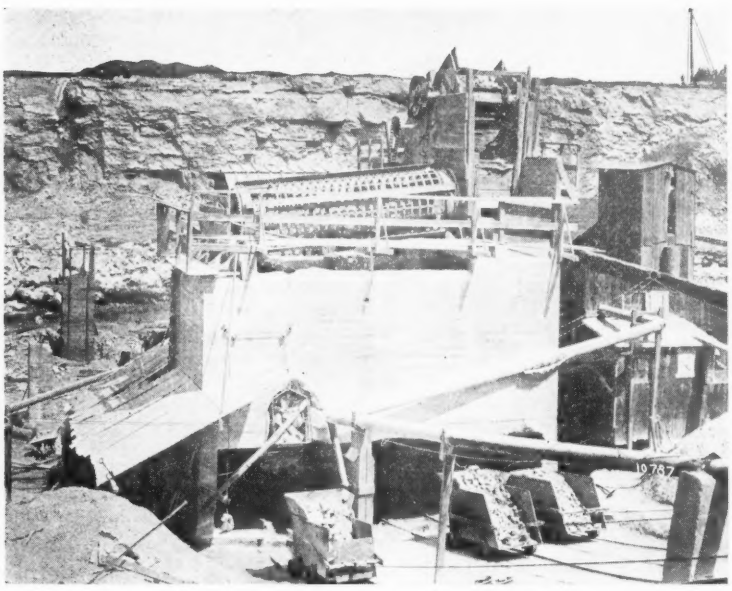
Eight Ways of Better Handling

These eight ways of usual and unusual methods in lime-plant operation were illustrated and described by H. D. Pratt, of the Link-Belt Co., at the recent meeting of the National Lime Association. Some of these methods may give you a helpful suggestion





The skip hoist at the Rockland-Rockport Lime Co.'s plant shown at the right is 112 ft. high, weighs 40 tons, and has two 3-ton cars or skips. The whole machine is operated electrically. Above is a closer view, showing the air operated kiln stone gates, which are practically perfect in operation



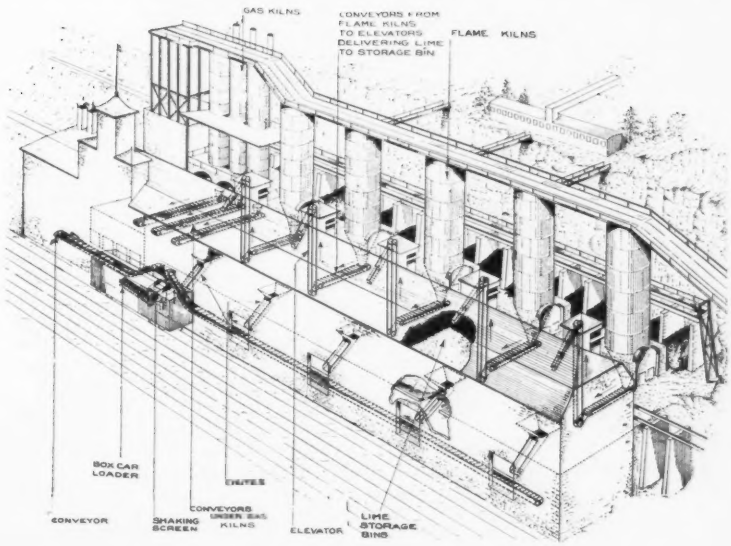
A simple plant which makes kiln stone economically. Stone from the crusher is carried up by a pan conveyor to the rotary screen which takes out the spalls into one bin, while the clean kiln stone drops into the last bin, and is pulled to the top of the kilns. This plant will handle as much as 100 tons an hour

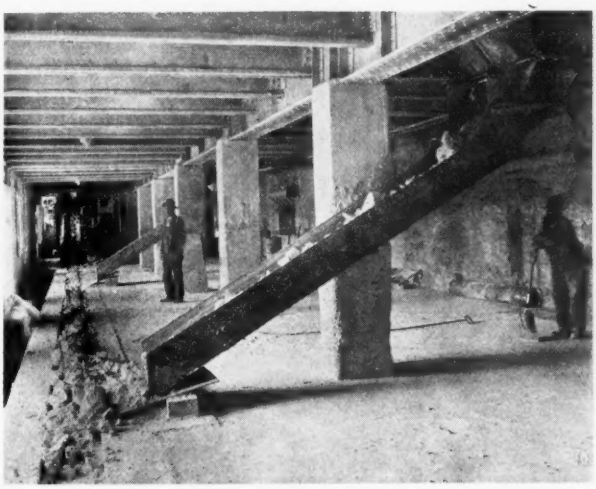


At the Merion plant the shaking screen with its removable chute end delivers lime in the door of a box car to the Pratt box car loader which gives the car its proper load. This loader is set in position to fill one end of the car and requires little attention except when it needs to be turned around to fill the other end of the car

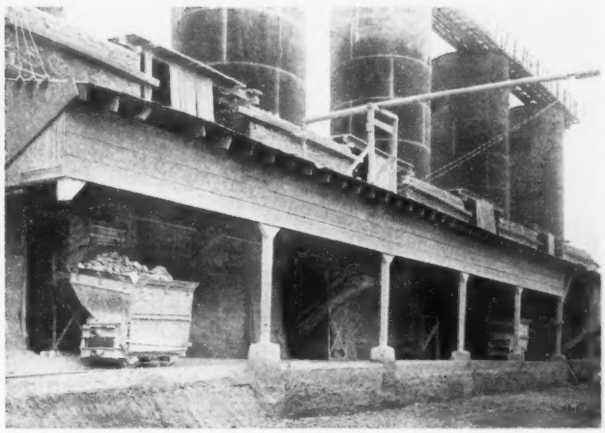
THE MACHINERY OF THE RIVERTON LIME CO.'S PLANT

At the right is a comprehensive view of the machinery in the Riverton Lime Company's plant. There are five coal-fired kilns and three gas-fired kilns, all drawn by conveyors. The lime is elevated into storage bins, drawn out by gravity, the core picked, and the lime delivered by pan conveyors to a central point in the plant, where a shaker screen takes out the fines. The lump (or run-of-kiln if desired) is delivered to a Manierre box car loader, while the fines are run to a crusher for the hydrating plant, and by the operation of a flap gate lump can be sent to overhead bins for barreling





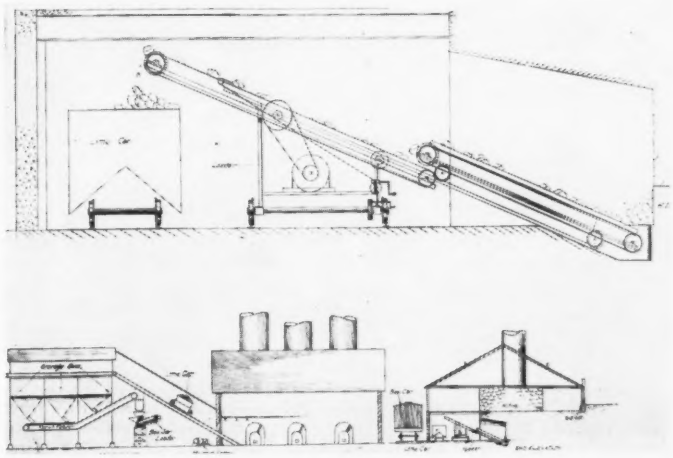
From the bottom of the lime bins at Riverton are chutes at the foot of which the core is picked out. The proper angle of these chutes was found by experiment, so that when lime is picked at the bottom of the chute and pushed into the conveyor, more lime will run slowly down, and thus give the core picker a regular supply



At the plant of the Merion Lime Co. the five pan conveyors shown below all run from a single motor operating line shafting, and are engaged and disengaged by a simple jaw clutch. One man can draw these kilns in the daytime, and the drawing at night is done by the firemen

USE OF TELESCOPIC DRAWING MACHINE

In the installation at the right there was difficulty in getting under the kilns. The doors are on the floor level, at varying distances from the front wall. A telescopic drawing machine is used which runs in front of each kiln and delivers the draw to a car on a second track, to be delivered to a cooling bin



More Power From Your Coal

Especially at this time when coal is excessive in price and difficult to obtain is it important that none of its energy should be wasted. Scale-encrusted boiler tubes are a cause of great heat-waste—scale often reduces the conductivity to half what it should be. Therefore this article on keeping boiler tubes clean, while frankly advocating compressed air cleaning against other methods, is particularly helpful now

ONE of the most persistent and heavy drags upon boiler efficiency is scale either enveloping or lining the boiler tubes. The thickness of this incrustation is dependent upon the character and the chemical composition of the water used and the time lapsing between cleanings. Again, the functioning of the tubes may be considerably hampered by deposits of soot or flue dust, which, like scale, check the normal passage of the heat through the metal walls to the surrounding or contained water—agreeably to the type of boiler in question.

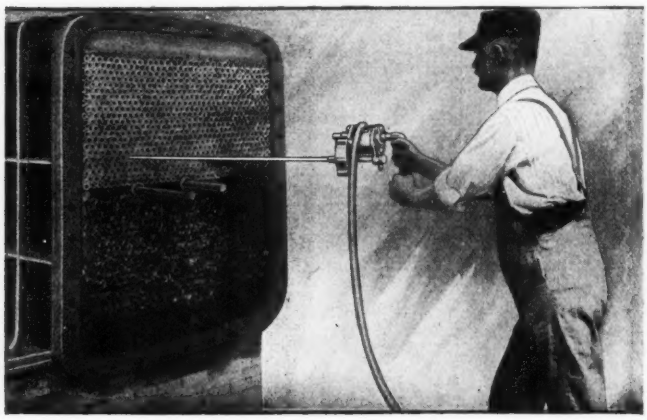
Scales are of various sorts, and some of them, because of their porous nature, constitute a lesser barrier between the hot metal and the water than other films which more seriously interfere with heat transference. Exhaustive tests have been conducted at the University of Illinois which show that scales varying in thickness from .02 in. to .13 in. and in density from very soft to hard and dense decrease the conductivity 2 to 20 per cent. Thicker encrustations will reduce the heat transmitted by 50 per cent and more.

It is important that the scale be completely removed and that the operation be performed without injury to the tubes. The measure of scale which may be tolerated without inducing breakdown or disaster—quite apart from the question of fuel wastage—is determined by the type of boiler and the working pressures carried normally.

The fire-tube boiler is generally of a low-pressure class, while the water-tube boiler is designed to generate steam rapidly and at considerably higher pressure. Again, the fire-tube boiler carries a larger quantity of water than its water-tuber competitor, and at the most efficient rate of evaporation the first will convert this water into steam in the course of an hour while the latter pattern of generator will evaporate all of its water content within a period of ten minutes or so. In the fire-tube boiler the water surrounds an aggregation of tubes through which the flame and hot gases from the fuel pass on their way to the smoke-stack, and, therefore, the smaller area, i. e., the interior, of these metal conduits is exposed immediately to the heat while the outside and bigger area is in touch with the water which absorbs this heat in the production of steam. As a result, the large volume of water in the fire-tube boiler is heated rather slowly.

The water-tube boiler, on the other hand, functions in the reverse order. The engineer puts the water to be heated inside of the tubes and surrounds these pipes with a greater volume of flame and hot gases. He thus increases his heating surface; reduces the area in contact with the water; and, by this arrangement, brings about a very speedy conversion of the water into steam at high pressure. The steam so generated exerts a bursting stress—the opposite of the compressive action which takes place in the fire-tube boiler, and this pent-up force tends to rupture the tubes in the direction of least resistance. Now it so happens that boiler-tube scale is commonly deposited unevenly upon the metal surfaces; and where the scale is thinnest the heat acts most upon the metal and causes it to expand there more than elsewhere. In this way the tube may be burned through before the cooling action of the water comes into play, or the redhot tube may distend and burst under the impulse of its contained steam or pressure.

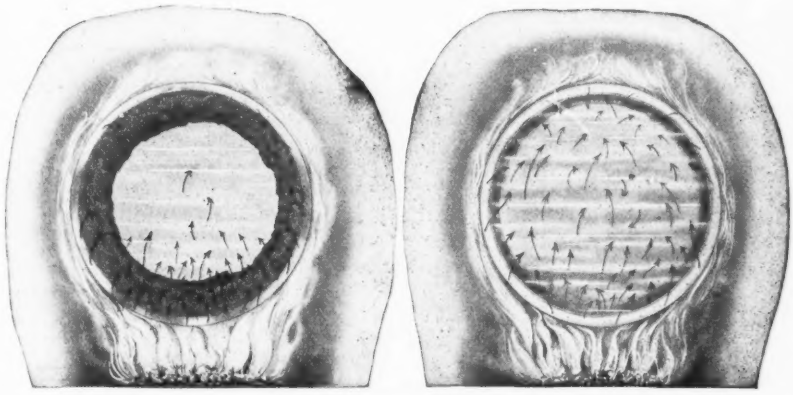
The foregoing picture should make it clear why it is highly desirable that boiler tubes be kept as clean as practicable not only in the name of security against failure or mishap, but as a safeguard against fuel sacrifices amounting annually to the equivalent of many millions of dollars. Cleaning boiler scale may be a tedious, vexatious, and rather costly undertaking or it may be accomplished rapidly, easily, and at a moderate outlay, according to the means employed. Various types of apparatus have been developed for this service. Some of these





The small tubes of a surface condenser are cleaned by air tools as shown at the left. At the right is a pile of scale cleaned from the boiler tubes—scale that was adding 10 to 20 per cent regularly to the coal bill so long as it remained in the tubes

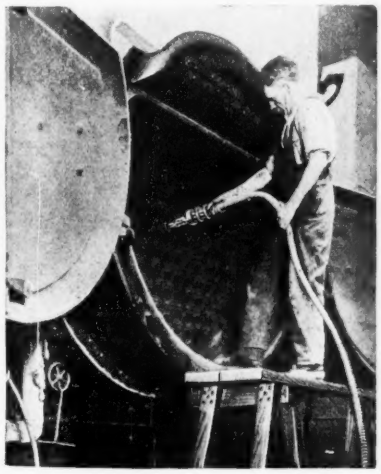
cleaners are driven hydraulically; others are actuated electrically, and a third class do their work under the impulse of either steam or compressed air. Up to a point each type has its virtues; but it is reasonably claimed by their advocates that the air-operated tools are the most adaptable and that they possess distinctive characteristics which put them at the forefront of the art.



Scale stops the free passage of heat, as the left diagram indicates. The clean tube at the right heats much more effectively

To insure the widest satisfaction, a cleaner must do its work thoroughly, do it quickly with a minimum of labor, be uniform in its action, do no damage to the tubes or any other part of the boiler, and in no wise imperil the operative. This is a pretty big order, and yet cleaners have been devised which subscribe fully to these several conditions.

Aside from the natural desire to protect an employe from harm there is the further incentive to safeguard him on account of the obligations imposed upon the employer by the various workmen's compensation laws. While steam can do all that compressed air can do still there is the ever-present risk of a bursting hose, and this menace is aggravated when the tool is being used by an operator within a confined space. Further, the exhaust steam has to be taken care of and led far enough away from the point of action to obviate trouble. Again, the heat of a steam-filled hose annoys or affects the worker, and his performance is slowed up. Steam is objectionable for another reason; it carries off the oil in the moving parts and adds just that much more to the cost of operation. Finally, the steam heats the enveloping boiler tube and causes it to expand—especially in a longitudinal direction. The force exerted by the expanding tube may be sufficient to crack the header, particularly if the latter is made of cast iron. This tendency is all the more pronounced when the neighboring boiler tubes are cold.



Frequent cleaning of boiler tubes saves coal

Up to a point, the electrically-driven cleaner answers well, but its shortcomings cannot be ignored. First, the operating current may be either deadly or damaging if short circuited by any rupture of the cable insulation; next, where the whole of the cleaner unit has to make its way through the length of a tube, it is not feasible to produce a self-contained electric motor, within the diameter available, of sufficient power to do the work properly and to meet the changing conditions with which it may have to contend. If the tool should jam, the motor may break its shaft, burn out, or, owing to its inertia and positiveness, injure the tube. Should the electric cleaner, on the other hand, be of a type in which the motor is always held outside the tube, then there is danger of the motor "kicking" vigorously whenever the tool jams. The operator may thus be thrown off his balance and fall, perhaps from some height. Because of its inability to adjust itself to circumstances—temper its action, so to speak—the electrically-impelled cleaner is not perfectly suited to deal with apparatus fitted with tubes of brass or copper.

The hydraulically-actuated cleaner has few of the weaknesses attributed to the steam or the electrically-driven cleaner; the use of water involves no risk of scalding, burning, or electrocution. But the impulse water must be got rid of; and the disposal of this exhaust is not the only aspect of the problem.

Until about ten years ago, scale incrustations were removed from the tubes of water-tube boilers by cleaners of the turbine-impulse type which were operated by pumping large quantities of water through the motor. After this water had passed the turbine wheel it had to be "wasted down" the tube, and it seriously interfered with the efficiency of the scale-removing tools which, of course, had to be advanced ahead of the motor. In search for better devices, cleaners capable of being driven by compressed air were designed, and the success in this departure became the basis of the modern air-driven cleaner. In this type of apparatus the exhausted compressed air, instead of proving a handicap as the discharged water had been, was effectively employed in assisting to clear out the tubes.

One type of these machines is equipped with a motor small enough to enter into and pass through a boiler tube; and the cleaner is controlled by the hose which conducts the impulse fluid to the motor. The rotary shaft has an extension at the forward end of the motor; to this the scale-removing fittings are attached in order to relieve the cutting mechanisms of the rush of water which was characteristic of hydraulically-driven apparatus, for the purpose of being free to work on the scale without hindrance. As a consequence it is claimed they deal with a job in a fraction of the time formerly required.



How the hinged rotary cutters perform their work in cleaning tubes

Later another pattern of cleaner was developed suited to the small tubes in feed-water heaters, ammonia condensers, surface condensers, evaporators, etc. Inasmuch as the tubes of most of these auxiliaries are made of brass or soft copper, it was apparent that it would not be possible to use

the earlier design of scale-removing heads even if the apparatus could be made of a size to fit into the tubes. Accordingly, a chisel-pointed drill was adopted, which is centered in the tube by supporting guiding-flutes, and, at the same time, a speed was fixed upon low enough to prevent the heating of the drill with its attendant loss in temper. This problem was solved by recourse to a back shaft which is geared to run a number of times slower than the main shaft while providing the needful turning effort or torque.

The motor of these tools—which can be driven by steam but preferably by compressed air—is, in effect, a positive-balance rotary engine, and for its size and weight, is exceptionally powerful. The makers of these devices say that because of this the motor is peculiarly adapted to tube-cleaning service in which the actual work is performed by a sustained centrifugal force delivered through expanding or tumbling heads. However, it is also claimed that the motors develop but little inertia or flywheel effect; and if the cleaning head jams or sticks the motor stops instantly so that there is no danger of cutting or damaging the softest of tubes. The motors are made to operate in straight or curved tubes which range in diameter from one and one-half to four inches; and their speed of revolution varies according to the duty demanded of them. Special tools are built for tubes up to ten inches in diameter. When dealing with a heavily-scaled tube, the worker holds the cutting head firmly against the scale, and this action reduces the rotary velocity—the consumption of air being cut down proportionately. While removing heavy and hard scale rapidly, four-inch cleaners require an air supply of 35 cubic feet per minute at a pressure of 60 lb. The main characteristic of an effective cleaner is that it must be made to fit the tube snugly and therefore cannot be pushed forward and through until all of the scale is disposed of. This feature will insure thoroughness and guarantee a condition within the tube that will make the most of the b.t.u.'s in raising steam. It is desirable that water be used freely to wash back loosened scale inasmuch as water will not injure motors of the sort in question.

So far, we have considered tools intended only for getting rid of scale within tubes. The same air-driven cleaners can be employed successfully in clearing away external incrustations. This is done by using a rotary vibrating head, which delivers to the inside of a tube a succession of light, glancing blows. The vibration set up is not a shaking or swaying of the tube, but, instead, a slight momentary change in circular form such as that produced in striking a bell. This flexure serves to crack the enveloping scale or deposit and to cause it to crumble and fall off. The "weaving" tangential blows do not have a hammer effect; and it is claimed that they will not expand the tube; start the weld to leaking, or promote other injuries.

Air-operated apparatus of the kinds described are working wonders in boiler-room economies; for it has been demonstrated repeatedly that they can increase boiler efficiency anywhere from 2 to 6 per cent; cut down the consumption of coal from 2½ to 10 per cent; minimize boiler repairs, and so reduce the time of cleaning that boilers may be speedily returned to service. Finally, because of the sureness, thoroughness, and rapidity of performance, these tools rob tube cleaning of its drudgery and put a premium upon frequent scale removal.—*Sidney Mornington in Compressed Air Magazine.*

Contract Signed for South Dakota Plant

FROM Monday to Thursday of this past week the entire South Dakota State Cement Commission, including the governor of the state, who is chairman of the commission, were in Chicago holding conferences with engineers on the proposed state cement plant for South Dakota. The result was the signing on Thursday of a contract with J. C. Buckbee Co., First National Bank Bldg., Chicago, Ill., for the design and engineering work on a 2000-bbl. plant on which construction is to commence as soon as possible.

The commission consists of Gov. W. H. McMaster of Pierre, who is chairman; A. C. Hunt, of Rapid City, secretary and treasurer; C. H. Ross, of Sioux Falls, and A. L. Wyman and S. G. Donaldson, of Yankton.

Mr. Hunt expects the construction will start in 60 days, and that if all goes well the plant will be producing by the end of next season. The plant will be located at Rapid City, where there is an unlimited supply of Minnesota limestone, much of which analyses as high as 98.5 per cent calcium carbonate. Gypsum and shale are also available on the same ground within convenient switching distance. Coal will be obtained from the Wyoming fields.

Whether the plant will be a dry process or wet process will depend upon the investigation of local materials and conditions which the engineers in charge of the work will proceed immediately to make. It is understood that the engineers favor a wet-process plant and Mr. Hunt states that the final decision will be up to the engineers following their investigation.

Mr. Hunt states that this plant is not in any sense a socialistic move, nor does the state plan to go into other activities in the same manner. Large quantities of cement making material are found as natural resources of the state, and since there are no cement plants in the state or within close shipping distance, those who sponsor the erection of a state plant believe that they are benefiting the state by making cement available at prices which will be much more advantageous than those which must include the high freight rates involved in the present long hauls for shipments made from existing plants to South Dakota.

From surveys that have been made the output of this plant is not expected to supply the entire demand, both public and private, of the state, but the quantity to be produced will more than supply the amounts needed for public uses and the excess will go through regular channels for private uses.

South Dakota papers were quoted recently in Rock Products as showing Senator A. L. Freelove to be opposed to the state cement project. Mr. Hunt wishes to correct the wrong impression which has been created. Senator Freelove is one of the strongest advocators of the cement plant and other South Dakota papers have published the written denial of Senator Freelove of the previously published incorrect statements.

Buy 2,500,000 Barrels Swedish Cement

ACCORDING to press dispatches, the North Carolina highway department has bought jointly with a large power company 2,500,000 bbl. of Swedish cement. The commission takes 1,000,000 bbl. for its road work. The reason given for this foreign purchase is said to be the lack of competition and absolute uniformity in the price charged for the domestic product; also the difficulty of securing cement in sufficient amounts.

The Swedish company assumes complete charge of the shipping and distributing of the cement. Distribution will be made from Wilmington, where a central point has been established. The cement is said to be contracted for at 20 cents per barrel below the price of the American article.

Advances Cement 18 Cents

PRESS dispatches from El Dorado, Texas, say that cement has been advanced 18 cents a barrel at that city, due to the shortage of coal and the lack of cars for transportation.

Reducing Portland Cement Spoilage

Ways to prevent deterioration during storage and transportation

By W. M. Myers
Assistant Mineral Technologist, U. S. Bureau of Mines

DETERIORATION of portland cement during storage over any considerable period of time has long been noted; closely related to it is deterioration of cement during transportation, which involves not only the time factor of storage but also exposure to varied climatic conditions. Deterioration in both cases is due to hydration of the cement by absorption of moisture from a humid atmosphere, or by exposure to actual rainfall. After hydration cement possesses no cohesive power; the degree of deterioration is directly proportional to the degree of hydration.

The amount of deterioration of portland cement during storage has been accurately determined in an investigation by the Structural Materials Research Laboratory, in co-operation with the Portland Cement Association. Cement stored in a shed in cloth sacks retained 80 per cent of its original strength after three months storage, 71 per cent after six months, 61 per cent after one year and 40 per cent after two years.

The deterioration of portland cement during storage and transportation was noted particularly in France during the World War. Information concerning cement used by the American Expeditionary Forces was furnished by Lt. Col. H. S. Spackman and Maj. E. C. Eckel, who had charge of practically all matters concerning cement used by the American Expeditionary Forces.

The cement used by the American Expeditionary Forces came from the following sources: 42,000 tons was French, Swiss and Spanish cement; 120,000 tons was English cement; 55,000 tons was made in plants operated by the American Expeditionary Forces; 500 tons (not over) from America. Deterioration was most marked in cement from the first source.

The climatic conditions in France are very severe for finished portland cement, owing to the long rainy season and the accompanying high humidity. Cement stored for a period of two months was sometimes almost worthless. Cement was not always stored where it could be reached easily, and some storehouses were emptied in the reverse order of filling, so that the material stored first was the last to be removed; some cement, therefore, was unavoidably stored longer than it could withstand the climate.

The deleterious effect of the climate of France on portland cement is constant. It is not dependent on unusual conditions, as is recognized by French manufacturers, who endeavor to send their product direct to the point of consumption immediately after grinding. The specifications of the French government for the storage of cement are strict, as may be seen from the following resume:

1. Cement must be stored in an air-tight room.
2. Cement must be covered with tarpaulin.
3. Cement must not be stored nearer than 18 in. to the wall.

Some English cement used in France was damaged further as a result of the English custom of shipping it in 200-lb. bags; these heavy bags are difficult to handle, and are torn by the hooks of the stevedores, thus exposing the cement directly to atmospheric conditions.

The quality of the little American cement used was satisfactory.

In the United States, portland cement is shipped in barrels, in cloth or paper bags, or in bulk in cars. Cement for export is generally packed in barrels. The superiority of American packing over European barreled cements has been noted by commercial agents of the United States in South America.

The use of air-tight containers for storing and shipping portland cement would obviously prevent deterioration, but the prohibitive cost of such containers would greatly outweigh the benefits derived from their use. Two feasible improvements have been suggested that would not only improve the quality of the cement but would also effect appreciable economy in transportation: (1) Storage and transportation of the cement in bulk; (2) storage and transportation of the cement in the form of unground clinker, and grinding the clinker at destination.

The U. S. Bureau of Mines conducted an investigation to determine the cause of the deterioration of Portland cement during storage and transportation, and to discover a means of preventing it. All available printed sources of information on this subject have been examined and a bibliography has been compiled. The subject has also been discussed with the leaders in the cement industry; the present report is the result of their co-operation, and is based principally on information thus obtained.

Storing and Transporting in Bulk

Deterioration of cement stored in bulk is less than in bags, owing to the smaller area exposed. Hydration takes place only at the exposed surface, and the bulk of the cement is unaffected. Cement transported in bulk must be shipped in a tight, closed car, and must be protected from moisture during loading, shipping, and unloading. Preferably it should be used immediately after unloading at the point of destination. This practice is now followed by several manufacturers and where conditions are suitable it is becoming more common as its advantages are seen. Shipping in bulk effects a saving by eliminating the use of bags—which is an important item in the cost of cement, and should also permit a saving in freight rates.

Handling as Unground Clinker

Clinker, the fused product of the cement kiln before it is ground to form the finished portland cement, is exceptionally well adapted for transportation or storage over long periods of time under adverse conditions. It is extremely inert and has no tendency to absorb moisture. Experiments show that clinker may be stored under water, or subjected to alternate dry and wet storage, without lowering the quality of the finished cement.

This cement has two distinct advantages: The quality of the cement produced from stored clinker is higher, and the grinding cost of the clinker is decreased because of mechanical disintegration.

The improvement in the quality of cement made from stored clinker is due to the hydration of any free lime (CaO) that may be present. Free lime is injurious to the finished cement, as it produces unsoundness. It is not present in a perfectly burned clinker, but it is present occasionally as a result of imperfect mixing of raw materials and of careless manipulation. Cement manufacturers, therefore, generally store clinker for several weeks or months before grinding.

Though portland cement in the form of clinker is most carelessly handled and

stored without regard to humidity or climatic conditions, yet improvement rather than deterioration of quality is manifest in the ground product.

The mechanical disintegration of clinker during storage makes grinding easier, thus somewhat increasing the capacity of the mills and decreasing the cost.

How Shipping Costs Are Cut

Clinker, like iron ore, can be handled in bulk in large quantities. Barges or steamers can be loaded cheaply and the heavy expense of using bags for the finished portland cement may be entirely eliminated. Freight rates on clinker shipped in bulk should be lower than the rate for bagged cement, hence an appreciable saving could probably be made on this item. It would not of course be practical to ship clinker short distances to points near the source.

Operating a Plant to Grind Clinker

The feasibility of operating a grinding plant in connection with any cement project depends on several factors, the following of which are the most important:

1. The cost of erecting the plant. This cost would vary according to the location, and with the cost and transportation of machinery and supplies.
2. Operating cost of plant, depending among other things, on the amount and type of power and labor available.
3. Loss in possible subsequent scrapping of plant.
4. Amount of cement used and possibility of continued demand.
5. Economies to be realized in transporting clinker to mill, as against loss in material by transporting the ground cement.
6. Difference in freight transportation for clinker and for finished cement.
7. Saving by eliminating the use of bags.

The actual expense of installing a grinding plant would probably not be less than $10,000 under the most favorable circumstances, so that it would be impracticable to grind clinker for any project using less than 30,000 or 40,000 bbl. of cement.

The transportation of portland cement in the form of clinker could be applied to any large construction project situated at a distance from the nearest cement mill in the United States; it could be applied also to a foregn market.

A prominent engineering company of New York is now engaged in a large construction project in Brazil, and is installing a clinker mill at Ceara, composed of two units having a capacity of 500 bbl. per day. It is planned to ship portland cement in the form of clinker and grind it at destination.

Handling Materials by Tank Cars

A proposed method of transporting cement which would greatly reduce deterioration, as suggested by Mr. Myers in the article above

HERE is a car body, writes Rudolph Welcker in *Compressed Air* for August, that constitutes a radical departure from the customary means of transporting solid materials.

This car body, as may be seen from the illustration, is designed to transport such materials as cement, fertilizer and other bulk stuff. Pneumatic means are utilized for loading and unloading, thereby dispensing with hand labor and costly terminal plants. This car body is rotated on the bolsters, loading openings are provided which may be sealed, and the cargo is discharged by a current of air under pressure.

In general appearance the car resembles the ordinary tank car with boiler-head sides. The tank is mounted on four pairs of rollers resting on special bolsters and has a series of loader openings extending practically over the length of the body.

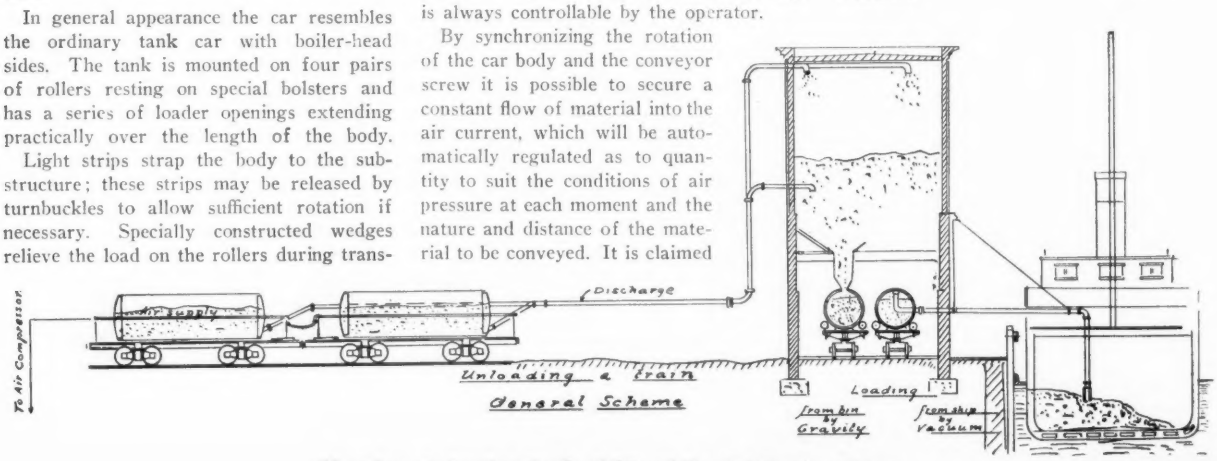
Light strips strap the body to the substructure; these strips may be released by turnbuckles to allow sufficient rotation if necessary. Specially constructed wedges relieve the load on the rollers during transportation and are released at the terminals. The operation of these cars is based on the physical properties of the material to acquire the characteristics of fluids when mixed with air under pressure.

When loading by gravity the car is loaded from the bins overhead through the series of openings parallel with the axis of rotation. These openings are then closed by manipulating the handwheels rotating the shafts. After transportation to the receiving terminal, the door is opened again and the car slowly discharged by rotating the car body on the rollers. The effect is similar to unloading the ordinary bottom-dump car except that the discharge is always controllable by the operator.

By synchronizing the rotation of the car body and the conveyor screw it is possible to secure a constant flow of material into the air current, which will be automatically regulated as to quantity to suit the conditions of air pressure at each moment and the nature and distance of the material to be conveyed. It is claimed that the power consumption has been reduced to ½ hp. per ton hour, about 14 kw. for a 40-ton car.

The cars can be made up of light tank steel and standard boiler-heads, and as the material is used economically no special reinforcement is necessary. The cars can be handled in train formation and the central air-supply pipes connected by standard brake couplings.

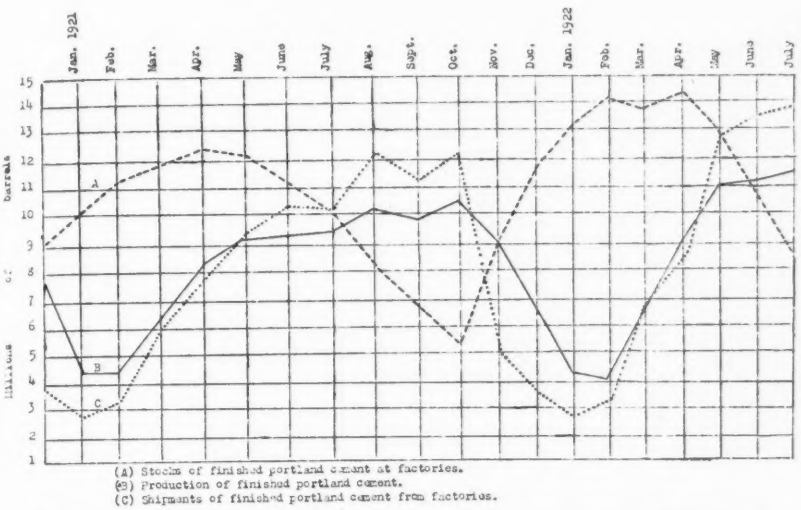
There is absolute prevention of loss by fire, moisture, theft or dispersion, by direct conveyance through the pipes, from car to ship, from ship to car, from bin to car, without exposing the materials to the weather.



Plant layout showing the flexibility of the distributing system

Cement Output for July

THE statistics shown in the accompanying table, prepared under the direction of G. F. Laughlin, of the U. S. Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The use of estimates was made necessary by the lack of returns from two producers.



Monthly fluctuations in production, shipments, and stocks of finished cement

Stocks of clinker or underground cement at the mills at the end of July were about 4,861,000 bbl. compared with 5,851,000 bbl. at the beginning of the month. The Bureau of Foreign and Domestic Commerce reports that the imports of hydraulic cement in June amounted to 14,179 bbl., valued at $30,400. The total imports in 1921 were 122,317 bbl., valued at $388,828. The imports in June were, from Denmark, 8,502 bbl.; Canada, 5,668 bbl.; other countries, 9 bbl. The imports were received in Porto Rico, 14,139 bbl.; Vermont, 21 bbl.; Maine and New Hampshire, 10 bbl.; New York, 6 bbl., and San Francisco, 3 bbl.

The exports of hydraulic cement in June were 96,263 bbl., valued at $283,011; of this 94,015 bbl., valued at $268,504, was portland cement, which was sent to Cuba, 42,228 bbl.; to the other West Indies, 3,041 bbl.; to South America, 25,008 bbl.; to Canada, 8,115 bbl.; Mexico, 7,684 bbl.; to Central America, 6,227 bbl.; and to other countries, 1,712 bbl. The total exports of hydraulic cement in 1921 were 1,181,014 bbl., valued at $4,276,986. The statistics of imports and exports of hydraulic cement in July are not available.

PRODUCTION, SHIPMENTS AND STOCKS OF PORTLAND CEMENT IN JULY, 1922, AND PRECEDING MONTHS

Month	Production (Barrels) 1921	1922	Shipments (Barrels) 1921	1922	Stock at End of Month (Barrels) 1921	1922
January	4,098,000	a4,291,000	2,539,000	a2,931,000	10,300,000	a13,316,000
February	4,379,000	4,278,000	3,331,000	3,285,000	11,400,000	a14,142,000
March	6,763,000	6,685,000	6,221,000	7,002,000	12,000,000	a13,848,000
First quarter	15,240,000	15,254,000	12,091,000	13,218,000		
April	8,651,000	9,243,000	7,919,000	8,592,000	12,600,000	a14,470,000
May	9,281,000	11,176,000	9,488,000	12,749,000	12,450,000	a12,893,000
June	9,296,000	11,245,000	10,577,000	13,470,000	11,150,000	a10,718,000
Second quarter	27,228,000	31,664,000	27,948,000	34,811,000		
July	9,568,000	11,557,000	10,301,000	13,850,000	10,414,000	8,424,000
August	10,244,000		12,340,000		8,280,000	
September	10,027,000		11,329,000		6,953,000	
Third quarter	29,839,000		33,970,000			
October	10,506,000		12,114,000		5,348,000	
November	8,921,000		5,195,000		9,091,000	
December	6,559,000		3,697,000		11,938,000	
Fourth quarter	25,986,000		21,006,000			
	98,293,000		95,051,000			

(a) Revised.

A New Illinois Association

EARLY in July Rock Products learned that all did not seem to be well with the association of sand and gravel producers in Illinois, the Illinois Concrete Aggregate Association. A statement from J. D. Pierce, secretary of the Illinois Concrete Aggregate Association, appeared in the July 15 issue of Rock Products. Below is a statement from W. G. Van Etten of H. D. Conkey & Co., producers and shippers of sand and gravel at Mendota, Ill., which puts a different light on the situation. The statement was made in reply to a request by Rock Products for further information:

"Due to the loss of membership in the Chicago district, it was deemed advisable by the down-state producers to dispense with the portion of the heavy expense that was necessary to keep up a Chicago office and a paid secretary, and accordingly a down-state organization known as the Illinois Sand and Gravel Association was organized.

"The present officers are: President, H.H. Halliday, Halliday Sand Co., Cairo; vice-president, O. J. Ellingen, H. D. Conkey & Co., Mendota; and secretary-treasurer, T. E. McGrath, McGrath Sand and Gravel Co., Lincoln, Ill. This association embraces practically all of the producers in the state with the exception of those in the Chicago district as well as several Indiana and Iowa operators."

It is understood that the Illinois Concrete Aggregate Association continues in existence and that in all probability certain of the association activities which the remaining members desire will be continued.

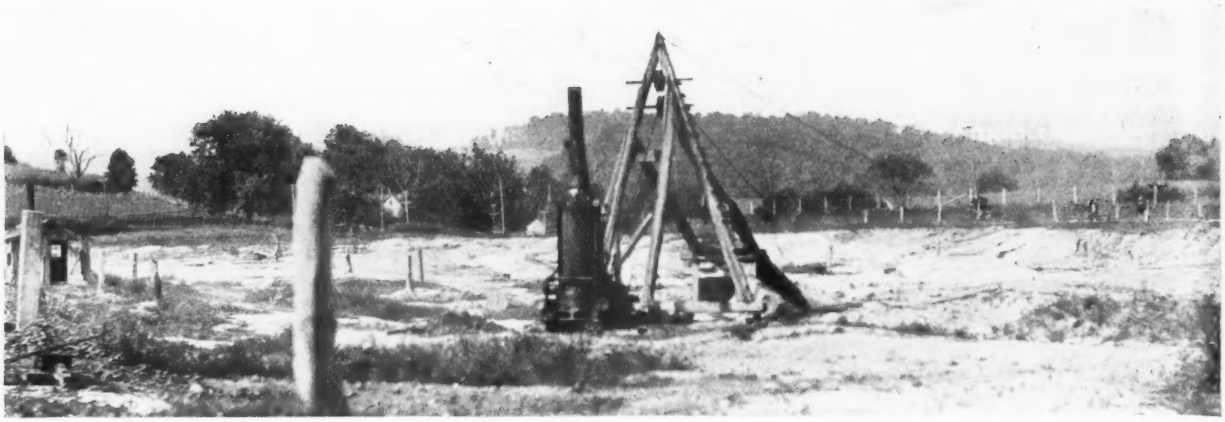
Public Rights to Road-Building Material

THE question of rights of the public to road-building material found within the limits of public highways in South Dakota has been defined by the attorney-general's department of that state.

The holding appears to be that while the rights of the public to a highway are considered as an easement, and only covers such as may be needed for the use of the public with the adjoining land owner retaining control of such portions of the highway not required for public use, it is further held that where elevations in the highway are required to be removed, the road material taken from these places may be used at any reasonable point on the same road, but the taking out of gravel where there is no necessity for such removal is held to be a source of supply under private control of the owner of abutting land.

German Potash Price Up 30 Per Cent

A BERLIN dispatch, under date of August 9, says that an increase in domestic prices for potash averaging 30 per cent was put into effect by order of the Imperial Potash Council. The old prices applied to orders received up to July 19.



A simple hoist for elevating buckets of kaolin

Reversing the Washing Process

In many sand operations clay is the product to be disposed of; in this kaolin production it is the 50 per cent of sand which must be separated and wasted or disposed of as by-product to leave the desired clay. The rather crude mining methods are described below

AT Hockessin, Del., near the Pennsylvania state line, is a plant where kaolin is made from rock, after going through several processes to refine and finish it for commercial use. The word kaolin was borrowed from the Chinese, in which country it was the name given to a hill or ridge containing deposits of white clay of which they made a grade of pottery they called china.

Geologically kaolin is decomposed feldspar. The decomposition causes the feldspar (which originally was rock) to become like very soft soap. Before its decomposition the feldspar may have been uncombined with other minerals, in which case the decomposition would produce a pure, soapy clay. But if it had been combined with quartz and mica (as it is in granite) the decomposition of the feldspar would leave a substance from which the quartz and the mica, which had not decomposed, must be removed in order to evolve pure clay.

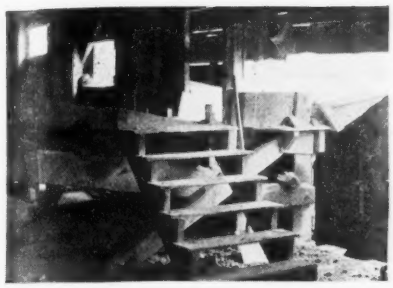
Deposits of this kind of kaolin exist to a considerable extent in the northern portion of New Castle county, Delaware, and the adjoining parts of Chester and Delaware counties in Pennsylvania. As far back as 90 to 100 years ago operations on a small scale were carried on in this territory for the mining of this useful product and the sale thereof to pottery manufacturers of New York, the buyers receiving the material in the crude state and refining it as best they could at the potteries.

About 60 years ago the seat of the American pottery manufacture of the better grades had become established at Trenton, New Jersey, and the subsequent career of the enterprise exhibits a growth and an advance in excellence of product that has made the Jersey capital renowned for the best grade of American china.



Two shafts, showing the method of timbering

Since the potter requires that his clay shall be pure (that is, unmixed with quartz and mica,) it is the separation of these materials that constitutes the task of the kaolin refining plants of Hockessin and vicinity. It will be sufficiently accurate to assume that the constituent proportions of crude kaolin are: one-half quartz, in the form of coarse sand; one-sixth mica, visible as tiny glistening flakes; and the remaining one-third pure clay, which is to be extracted. If the kaolin deposits occurred at, or close to, the ground surface it would be a simple undertaking to dig out the crude material and deliver it at the refining mill. But ordinarily the deposit begins at 10 or more feet below the surface, extending downward 60 to 80 ft. farther, so that, in order to procure anything like the entire content of a given deposit, provision



Raw material enters here

must be made for preventing the caving in of adjoining ground while the miners are excavating, and for the purpose the most satisfactory process yet employed is known as shafting.

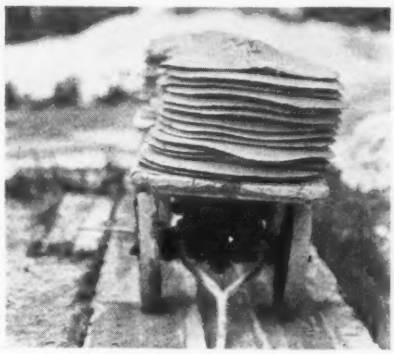
This consists of selecting a place which overlies the kaolin and digging a round hole 20 ft. in diameter, which is the shaft. After sinking it to a depth of 5 ft. there is placed around the circumference of the hole at the bottom a circle of 21 timbers, each timber 6 in. wide, 4 in. thick and 36 in. long, the timber ends being sawed for properly metering to the circle. Then a second circle of timbers is placed on top of the first with the joints crossed and the two courses are spiked together. Fifteen such courses will line the entire



600 ft. of settling troughs

5 ft. that has been excavated. Then the miners resume, dig the shaft 5 ft. deeper by hand shoveling into buckets elevated by engine and windlass, maintaining the same diameter of 20 ft., and insert another 5 ft. of timber as before and so on, to the bottom of the deposit.

Such shafts have been sunk 125 ft., the timbers then removed, section at a time from the bottom up, and the shafts refilled with dirt. To sink such a shaft 5 ft. and timber it represents under favorable conditions a day's work for nine men and a steam hoisting engine, and if



Handling the clay cakes

the whole day's digging were in kaolin the output of crude material would be 100 tons.

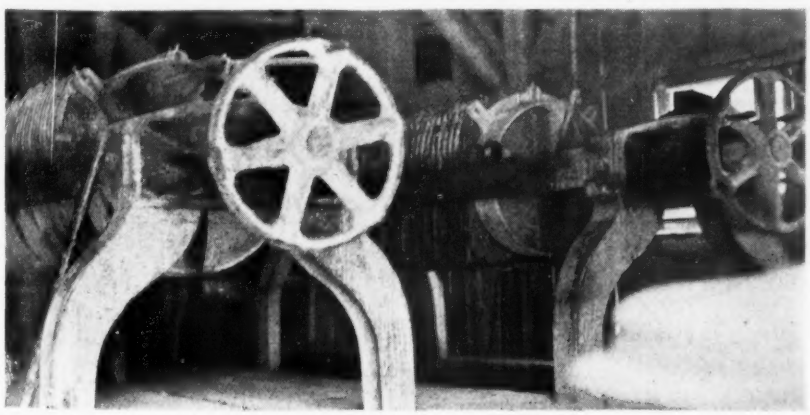
At the refining mill the crude kaolin is shoveled in at one end of a horizontal cylinder called a plunger, into which with the clay goes a bountiful supply of clear



Where the cakes dry

water. From end to end through the middle of the plunger an iron shaft with projecting steel blades rapidly revolves, thus beating the clay and water into what are called slips. In this state the law of gravitation is employed to effect the complete separation of sand, mica and clay. At the outlet of the plunger the sand falls into a water tight box, from which the elevators convey it to the carting place. The mica and clay (diluted with abundance of water) now enters a series of troughs, 600 ft. long, which conducts the slowly flowing streams to a cluster of settling vats. It is on this 600-ft. journey that the mica, being heavier than the clay, settles out.

The separation of the clay from the water begins in the settling vats, free from agitation; natural law precipitates the clay at the bottom and leaves the clear water to be drawn off from the top. The clay, now in the consistency of thick cream, is then forced by pumps into presses. The construction of a press is such that when in operation it receives the creamy clay into 80 circular chambers. These chambers are 1 in. thick by 2 ft. in diameter, formed by the 80 successive iron leaves of which the press is composed. Within each chamber is a canvas, and as these will pass nothing but the water, there is left the clay as hard as putty, within the 80 chambers. Workmen then remove from each chamber a cake of clay dry enough to handle. The next move transfers these clay cakes to the shelves of out-of-door drying sheds, where they are dried and made ready to ship.



These presses retain the clay

To Study Aggregates

IN the recently announced committees of the American Concrete Institute for the coming year, the names of several men well known in the rock products industries appear on Committee E-5, which is charged with the study of different materials suitable for use as aggregate and the method of test which should be applied to these to determine the quality. This committee is also charged with the preparation of specifications for the purchase and use of these aggregate materials.

On the committee are E. G. Sutton, formerly secretary of the National Sand and Gravel Producers' Association and now vice-president of the Carmichael Gravel Co., Danville, Ill.; H. J. Love of the National Slag Association, located in Cleveland, Ohio; Otho M. Graves of the General Crushed Stone Co.; F. S. Beard, a sand and gravel man of Detroit, Mich., and R. L. Morrison of the Concrete Products Co., Birmingham.

The other members of the committee not directly in the rock products industries are: A. T. Goldbeck, Division of Tests, Bureau of Public Roads, Washington, D. C., chairman; C. M. Chapman, 171 Madison avenue, New York City; R. S. Greenman, State Engineers Department, Albany, N. Y.; A. N. Talbot, University of Illinois; J. A. Turner, Philadelphia; H. A. Lane, Baltimore, Md., and R. B. Young, 8 Strachan avenue, Toronto, Canada. Mr. Young is secretary of the committee.

Quarried from Life

By Liman Sandrock

Welcome the Mononites!

IF it had occurred to him at the time—he was born in Lafayete, Ind., on March 1, 1876—George Balfe might have exclaimed with Pershing: "Lafayette, we are here!" But at the age of one minute who of us realizes our surroundings?

There was another Balfe, Michael William, who wrote the immortal "Bohemian Girl," so dear to the hearts of us who had the sense to be borne some years before George. We do not know if he traces any relationship; we do know that he loves music, for he sat with us last January at the theater party during the National Crushed Stone Convention. He hummed and haw-hawed throughout the evening—and we were with him!

Soon after that fateful March 1, George began to take notice, and did the usual things a red-blooded boy will do, from stoning the neighbors' cats, crowding the swimmin' hole, and playing hookey to going to school and getting away with it. In due course he became a C. E. (no, not a Christian Endeavorer—a civil engineer), graduating from Purdue University, class of '94.

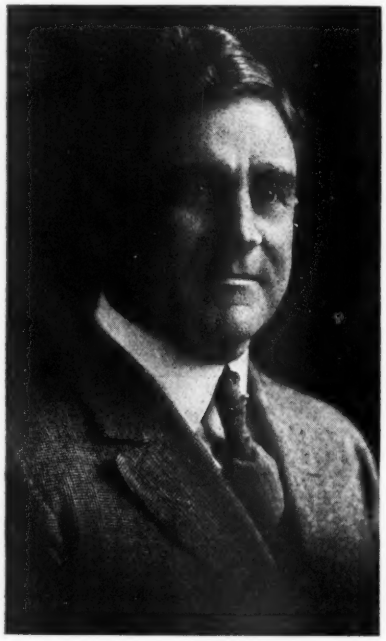
Embarking in business he operated the Lafayette Artificial Ice Co., the Lafayette Sanitary Milk Co. (note the intimacy of water and milk in the latter business), and the Consumers Coal Co. He was also president of the Indiana Ice Manufacturers' Association. In 1920-21 George was president of the Indiana Crushed Stone Association.

How he became associated with the Monon Crushed Stone Co. is very interesting. Herman Evans, head of his company, died in 1918 and the plant was closed down as its products were considered "non-essentials" (the Lord forgive 'em!) at that time. After the armistice this company was reorganized and put in operation in May, 1919. George H. Balfe was made its president and general manager, Mrs. Grace M. Evans the secretary-treasurer, William B. Newman sales manager, and John McGuire, superintendent.

The name Evans has been well known in Indiana for a number of years, and Mrs. Evans is proudly continuing the business. One of the few women in the industry, she is a top-notcher as a business woman, having at one time studied law. Mrs. Evans can talk stone from any and every angle, and has studied the game from A to Z. Her slogan is "Good Roads."

In fact, this Monon family is as one in its endeavors to produce the best of material, watch the market for good business, and deal as fairly with its clientele as it does with one another.

"Just ask Bill" is the way they direct many of their undertakings—and William Newman has the answer. He was a highway superintendent for Lake county for years, and that county today has some bully highways that are monuments to his ability as a road builder.



George H. Balfe, president and general manager the Monon Crushed Stone Co.

Cappy McGuire, the super, learned to ask much more than "When do we eat?" while in your Uncle Sam's service. He accumulated a lot of useful knowledge that later stood him in good stead. Before joining the colors he was a power-plant efficiency expert. John McGuire's motto is: "Cheaper stone and more of it."

On our visit we dined at the "Blackstone Annex," as they call the cook house. And Mrs. Evans did the cooking! Ever hear an ebony son say "chick'n?" Golly, white, man, how we did desire to crave that same! Glance at our group picture taken when Mrs. Evans summoned them to dinner.

What's George's relaxations? Whisper! We'll broadcast it to the well known world—he's a radio hound! During our interview, seated at the radio set, he interrupted us whenever we asked a personal question with "Hogs $7 a hundred"; "McCormick marries an opera singer"; "Seven killed in a Paris explosion." He babbled of grid potentials, body capacities, potentiometers and the like until we were fairly woozy. He really has an efficient set, easily getting Detroit, Chicago, Kansas City, Cleveland, Newark—everything but the grouches of unreasonable customers. Here he has to face the music. We all do, and without the carmuffs.

George Balfe is also an organizer and an expert accountant; he even does his own designing. Surely you will admit that he is a worthy brother of the Quarried from Life Family. And he's hereby adopted.



JUST BEFORE THAT CHICKEN DINNER

"Dinner is ready, gentlemen," says Mrs. Evans. "Isn't that odor delicious!" says George. "Lead me to it," says Bill. "Chicken's my middle name," says Cappy. (And US? We couldn't wait for the picture!)

Editorial Comment

Size Up Your Situation

What you are doing and what you plan to do to meet the unusual situations in which nearly all producers of ROCK PRODUCTS are placed at the present time depends pretty much on how you size up your individual situation. It is in a general way only that the effect of present conditions is the same on producers of the different rock products in various locations. Your situation in one part of the country or another, your location on one railroad or another, or the degree to which you depend on coal, or open-top cars, or on other fuels and methods of transportation makes your problem pretty much of an individual one. The variety of individual conditions is shown in the many telegrams received during the past week by ROCK PRODUCTS.

Throughout the replies, of course, there is the realization that the situation is more or less acute, that cars are not likely to be available, that coal is still scarce and high in price, and that construction generally is being held up in such a way as to seriously hurt producers of aggregates and building materials.

Each producer is thinking, and thinking seriously, about the situation and what it means to him. He is doing just what he should do—sizing up the situation for himself. What action he will take depends upon the estimate at which he arrives. Will he enter individual protests to the Interstate Commerce Commission, to his representatives in Congress, to state authorities, and to the railroads; will he encourage his association, state and national, to take action in the form of a united protest; will he try to co-operate with and secure the co-operation of officials and men with large building construction programs on hand; will he investigate the possibilities of greater use of water transportation, motor truck shipments, trolley, freight shipments, and similar methods; or just what will be do? It may be any one or all of these things, or it may be still something else suggested by his careful estimate of the situation as it affects him individually.

Above all, he will realize that others are similarly affected—other producers, highway officials, construction companies, contractors, producers of other building materials—and he will try to work with them in the common cause of securing justice to all.

Don't Kick Too Much

While, after all, complaints may have little effect, it may be better to use care in the nature of those complaints to see that they are not without appreciation on the human side of the situation. The statement of the position of the Wisconsin Mineral Aggregate Producers is greatly strengthened by its frank recognition of "the need for the equitable and proper distribution of coal to offset the hardships of the coming winter," and no doubt all producers agree with their Wisconsin brothers in their willingness to "gladly close their plans if by doing so they could remedy or alleviate the possible suffering of the people due to the shortage of coal for the homes or a general shutdown of essential manufacture."

It is this tolerant attitude which will gain for producers the confidence and sympathy of the public and the authorities in charge and help them in their real fight which hinges on the injustices which so frequently occur in a period like this.

Good Work

Associations and association officers are frequently in a position where they desire to increase their membership or make the present association more valuable to the present members. There is no better way to accomplish either of these purposes than by serving the members in the best possible way, and the example of the National Association of Sand and Gravel Producers is one that can be profitably studied by other associations. This organization has its headquarters at Washington and the most serious difficulties of its members, shortage of cars in which to ship materials, is being solved by individual attention to individual complaints. The association is in the thick of things so far as getting service and fair treatment for its members, and this is the kind of service which association members appreciate and show their appreciation in continuing and increasing support.

Doing Without Coal

Word has come that hydro-electric current is replacing coal to make steam in a number of paper mills. One horsepower of electricity per year is the amount needed, according to the report, to supply the amount of heat equivalent to that in a ton of good Pennsylvania bituminous coal. In water-power districts coal may be permanently displaced by this new competitor. Other coal substitutes are appearing here and there.

A brick plant near Albany is changing over from coal burning to oil burning, and while the change is reported to be a temporary one, to continue only during the coal shortage, the experience gained in this change may show how brick can be successfully and economically made without the aid of coal.

Coal operators and workers may be doing themselves more harm than they think in this strike by encouraging substitutions which will permanently lower the demand for coal.

Accident Prevention

Crane Safety Devices and Their Uses

By Nicholas Prakken, Pawling and Harnischfeger Co.

PRESENT-DAY methods of production call heavily upon the electric overhead traveling and transfer cranes and the electric cage or floor controlled monorail hoists to perform their part. Without this general class of requirement progress would be at a standstill, for hoisting equipment is most universally used in one form or the other in all of the industries. There are as many different types of cranes and hoists today as of kinds of service that demands them. This article will be confined to the cranes used in foundries, machine shops, yards, and warehouses.

Electric cage-controlled monorail hoists are oftentimes used in connection with transfer bridges in the same capacity as cranes, with the added flexibility that it can leave its bridge and travel to remote points on permanent overhead I-beams, either to pick up a load or to deliver one. Electric floor-controlled hoists have the same flexibility, but are limited in speed to that of what a man can cover in walking. With the electric cage of floor-controlled monorail hoists accessories are available for its flexibility of operation, such as switches and turn tables. These accessories incorporated in a system with curves make it possible to give service to the different parts of a plant.

Cranes

The standard electric overhead traveling crane is the most serviceable of all. The girders span from wall to wall and the crane usually runs the entire length of the building, passing over workmen with its burden.

The crane is composed of three units—bridge, trolley and cage.

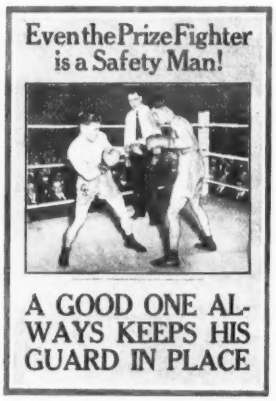
Each one of these may be again divided:

Bridge

The bridge is composed of truck ends, girders, bridge machinery, foot-walks and electrical equipment. The safety features are naturally a part of the design. The first essential is liberal strength in the properly proportioned parts of every unit piece in the crane.

The truck ends must carry the total weight of the girders, trolley and load. The truck ends in a well-designed crane are usually of a box section with cast-steel truck housings securely riveted in between the channels forming the side members of the truck ends. It is in the truck ends where the safety features are found. Rail chocks on this steel housing project one or more inches below the top of the runway rail, preventing the truck end from leaving the runway in case a wheel breaks. Then the truck ends are provided with steel-plate rail fenders that fit over the rail. Their function is to brush a workman's hand off the rail. Spring bumpers are likewise attached to the top of the cast-steel truck housing to prevent the wheels of two cranes on the same runway running into each other. In the M.C.B. bearing, used almost universally, the wheel is keyed to the pin and the pin revolves in bronze journals on both sides; they are accessible and readily renewed.

Human Interest Pictures With Safety Messages



This is but one of 500 bulletins issued yearly. Each bulletin is in colors, 9 in. x 12 in. or 17 in. x 23. in.

Every National Safety Council bulletin (poster) tells a story that is just bound to attract attention and make an impression. Perhaps the workers may forget safety rules and regulations, but safety bulletins teach them safe habits.

Thousands of other companies with problems like your own are using safety bulletins to prevent accidents and decrease accident costs. You can profit from their experiences and get their bulletins to help you do the same thing in your plant.

For further details and sample bulletins write to

The National Safety Council
The National Non-Profit Accident Prevention Association
168 North Michigan Avenue, Chicago

Girders

Girders depending upon the span and capacity of the crane are either I-beam, I-beam and channel, web girder, lattice box or box girder. The girders most used are the I-beam and channel and the box. The I-beam and channel girder is used on medium span in capacities up to 15 tons. The box girder is usually built up to about 125-ft. span and at any reasonable capacity. The girders should be strong enough to prevent undue lateral deflection. The greatest load will be imposed upon the girder that has the bridge machinery and foot-walk mounted on it. The safety feature in the girder mounting is the coping of the girder around the box section of the truck ends and securely fastening the two together by top angles, vertical shear angles and bottom cover plates. Many cranes are assembled by merely bolting the girders to the tops of the truck ends. This method permits the trucks to rock if a bolt becomes loosened. With the girders coped into the truck ends the bridge becomes an entirely structural unit.

With the addition of the motor bracket with the motor, the entirely enclosed bridge motor drive gear case and the gears, the bridge machinery and foot-walk produce a torsional strain in the girder. The girder can carry this load more safely when coped into the truck ends than if set on top. The safety features in the foot-walk are strong, angle-iron hand rails, and running the floor boards solid to girder, with a 6-in. angle-iron bordering the foot-walk, no tools or parts can be kicked off. Oftentimes there are foot-walks on both crane girders. This is advisable, unless the trolley is of such design that an extra foot-walk is imperative.

Trolley

The component parts of the trolley are: trolley sides, girts, gears and gear cases, drums and electrical equipment.

The trolley sides are preferably of box section, with M.C.B. trucks and rail chocks. The rail chocks function in the same manner as those on the truck ends of the bridge. The structural girts are bolted in between the trolley sides. On the trolley sides and girts are placed the motors, with enclosed gear cases and gears, equalizing sheaves and the limit switch. The greatest safety features on the trolley are the enclosing gears and the limit switch.

The safest type of upper limit switch is the one opening the hoisting motor circuit through a relay. This switch consists of a weight, a cable, a weighted sheave and a connection box. The weighted sheave shaft has an insulated arm that closes the relay circuit by the weight attached to the cable. Fastened to the suspended weight is a loop through which one of the hoisting cables passes. Irrespective of the swinging of the load, the load block in its upper travel will carry the suspended weight upward, allowing the weighted sheave to open the relay circuit and opening the motor circuit and bringing the motor to rest.

(To be continued)

New Machinery and Equipment

Portable Conveyors for Material Handling

THE Northern Conveyor and Mfg. Co., Milwaukee, Wis., are manufacturing a line of portable conveyors that can be hung from cranes or "I" beams and operated on hoisting trucks or installed in yards or sheds for material handling. It is marketed under the trade names of "Northern King" and "Northern Junior."



This portable conveyor is 65-ft. long. Here it is raised to a height of 32 ft.

All "Northern King" portable conveyors have 14-in. belts, rubber or canvas, and are built of any length from 11 to 100 ft. Either motor or gasoline power is furnished. The framework of the conveyor is 32 in. wide and 19 in. high, over all 25 in., the hopper end being 34 in. wide and from 4½ to 12 in. high. When motor-driven, the conveyors have bevel gear and shaft drive, while gas engine conveyors have chain drive. The material belt operates on rollers in concave form and returns on the inside of the framework on rollers and oval slides. The belt is furnished with or without cleats and a scraper is provided under the hopper so as to keep the belt clean.

The hoisting truck is built to raise or lower any length of conveyor. The wheels are 3 to 4 ft. high with 4-in. tires and 10-in. hubs. A screen or spout can be attached to the end of this conveyor, which has a capacity of 100 tons per hour.

The "Northern Junior" conveyor is built like the "Northern King" except that it is proportionately smaller. The small conveyors have 16-in. rubber belts and are built in lengths of from 10 to 30 ft. They have a 50-ton per hour capacity.

The conveyor shown in the illustration is 65 ft. long, motor driven, and is used for handling gravel into a bin 32 ft. high. This conveyor is raised 32 ft. The New York state highway commission, the manufacturers claim, is using 22 Northern conveyors for material handling.

Locomotive for Light Haulage

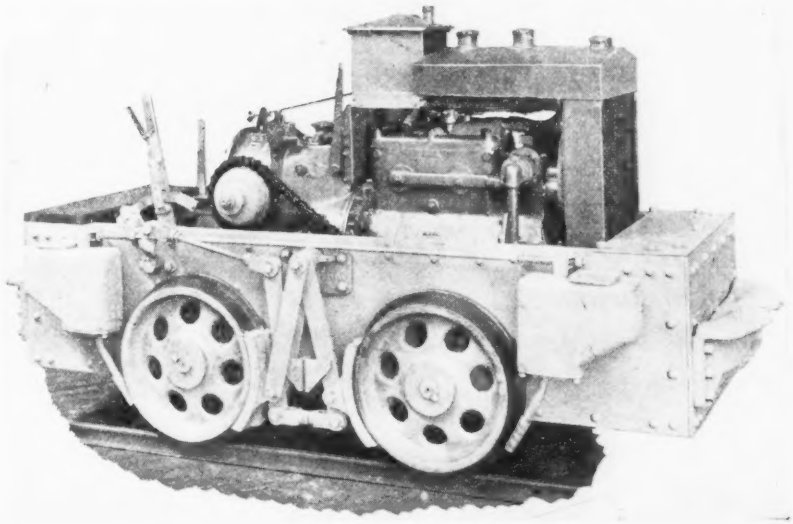
A COMPACT gasoline locomotive for light haulage service has been put on the market by the Atlas Car and Mfg. Co., Cleveland, Ohio, built to withstand severe service.

The motor is of the rugged tractor type, with all parts enclosed and protected, but still easily accessible. The intake air is washed by passing through a water clarifier which removes the dust. The lubricating oil at one point in a central reservoir reaches all parts of the motor and transmission.

Just behind the flywheel is the clutch, placed in the usual manner, and the propeller shaft mounts at its extremity a bevel pinion which is in constant mesh with two bevel gears, causing the bevel gears to rotate in opposite directions. Forward or reverse motion is obtained by engaging either one of these bevel gears by means of a sliding gear clutch. A neutral position is also provided. The drive from the bevel gear shaft is by a spur gear reduction to the jackshaft on the extremities of which are mounted sprockets which drive the axles through the roller chains.

The power plant is mounted in a standard locomotive frame such as are used in all Atlas electric locomotives in mining and industrial service. Complete locomotive equipment is provided.

Speed changes are obtained by throttle control similar in operation to steam locomotive. All control levers are conveniently grouped in the operator's compartment.



Gasoline locomotive for light haulage

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.25	1.10	1.10	1.10	
Buffalo, N. Y.			1.30 per net ton all sizes			
Chaumont, N. Y.	1.00		1.50	1.25	1.25	1.25
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	
Coldwater, N. Y.			1.50 per net ton all sizes			
Eastern Penna.	1.35	1.35	1.35	1.35	1.35	1.35
Munns, N. Y.	.75	1.10	1.10	1.10	1.10	
Prospect, N. Y.	.75	1.25	1.25	1.25	1.25	
Walford, Pa.		1.30	1.30	1.30	1.30	1.30
Western New York	1.00	1.20	1.20	1.20	1.20	1.20
CENTRAL						
Alton, Ill.	1.75		1.40	1.35	1.35	
Buffalo, Iowa	.90		1.20	1.00	1.05	1.05
Chicago, Ill.	1.20	1.60	1.20	1.20	1.20	1.20
Dundas, Ont.	1.00	1.35	1.35	1.25	1.10	1.10
Faribault, Minn.					1.75	
Greencastle, Ind.	1.25	1.10	1.00	.90	.90	.90
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.50
Krause, Columbia and Valmeyer, Ill.	1.40	1.35	1.35	1.35	1.20	1.20
Lannon, Wis.	.85		.95		.85	.85
Mitchell, Ind.	.80	.80	.80	.80	.80	.80
Montreal, Canada	.85	1.20	1.10	1.05	1.00	
Montrose, Ia.		1.50	1.60	1.55	1.45	1.40
River Rouge, Mich.	1.00	1.10	1.10	1.10	1.10	1.00
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	
Southern Illinois	1.35	1.25	1.25	1.25	1.10	
Stolle, Ill. (I. C. R. R.)	1.30		1.35	1.35	1.35	1.35
Stone City, Iowa	.75		1.40	1.30	1.25	
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25	2.25	2.25	2.00	2.00
Waukesha, Wis.			Prices include 90c freight all sizes .80 per ton			
SOUTHERN:						
Alderson, W. Va.	.75	1.25	1.40	1.25	1.15	
Bromide, Okla.	1.50			1.50	1.50	
Cartersville, Ga.		2.00	1.40	1.25	1.25	
Chickamauga, Tenn.	.90@1.00	.85@1.15		.75@1.00	.75@1.00	
Dallas, Texas	1.00	1.00	1.00	1.00	1.00	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00		
Ft. Springs, W. Va.	1.00	1.30	1.40	1.25	1.15	
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	
Ladds, Ga.	2.00	2.00	2.00	1.50	1.50	1.50
Morris Spur (near Dallas) Tex.	1.00	1.25	1.25	1.25	1.25	1.00
WESTERN:						
Atchison, Kans.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs and Wymore, Neb.	.20	.25	1.65	1.55	1.45	1.40
Cape Girardeau, Mo.	1.50		1.50	1.50	1.25	
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.40

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	
Branford, Conn.	.80	1.50	1.25	1.15	1.00	
Bound Brook, N. J.	2.00	2.30	1.90	1.50	1.40	
Dresser Jct., Wis.	1.00	2.25		1.75	2.00	
Duluth, Minn.	.90@1.00	2.25	1.90@2.00	1.40@1.50	1.30@1.40	1.50
E. Summit, N. J.	2.10	2.30	2.00	1.70	1.40	
Eastern Mass.	.60	1.85	1.60	1.50	1.50	1.50
Eastern New York	.75	1.60	1.60	1.40	1.40	1.40
Eastern Penna.	1.25	1.70	1.60	1.50	1.40	1.40
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.35@1.45	1.15@1.25	1.05	.95@1.00	
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	1.75
Richmond, Calif.	.50*		1.50*	1.50*	1.50*	
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Springfield, N. J.	2.10	2.30	2.00	1.70	1.40	
Westfield, Mass.	.60	1.35	1.25	1.10	1.00	

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Buffalo, N. Y.—Granite	.90		1.20	1.00	1.05	1.10
Berlin, Utley and Red Granite, Wis.	1.50	1.60	1.40	1.30	1.30	
Columbia, S. C.—Granite			1.75@2.00	1.75	1.60@1.75	
Dundas, Ont.—Flint	1.00	1.50	1.50	1.50	1.25	1.20
Eastern Penna.—Sandstone	.85	1.60	1.55	1.40	1.35	1.35
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.30	1.30
Lithonia, Ga.—Granite	1.00		1.50	1.25	1.25	1.00
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30		1.20	
Middlebrook, Mo.—Granite	3.00@3.50		2.00@2.50	2.00@2.50		1.50
Sioux Falls, S. D.—Granite	1.00	1.60	1.55		1.50	

*Cubic yard. †Agrl. lime. ||R. R. ballast. §Flux. ‡Rip-rap, a 3-inch and less.

Agricultural Limestone

EASTERN:

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.00; bulk **2.50**

Grove City, Pa. — Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$—100% thru 20 mesh, 60% thru 100 mesh, 40% thru 200 mesh; in 80 lb. paper sacks, 4.50; bulk 3.00

Hillsville, Pa. — Analysis, 96.25% $CaCO_3$—Raw ground; sacks, 4.50; bulk 3.00

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$, 5.25% $MgCO_3$; pulverized limestone; sacks, 4.00; bulk 2.50

New Castle, Pa.—89% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

Walford, Pa.—Analysis, 50% thru 100 mesh; 4.50 in paper; bulk 3.00

West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.25—cloth, 4.75; bulk 3.00

CENTRAL:

Alton, Ill.—Analysis, 97% $CaCO_3$, 0.1% $MgCO_3$—90% thru 100 mesh 6.00

Bedford, Ind. — Analysis, 98.5% $CaCO_3$, .5% $MgCO_3$—90% thru 10 mesh 1.50

Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Bellevue, Ohio — Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh 1.25

Bettendorf, Ia., and Moline, Ill.—98% $CaCO_3$, 1% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh 1.11

Buffalo, Ia.—90% thru 4 mesh 1.00

Cape Girardeau, Mo. — Analysis, 93% $CaCO_3$, 3.3% $MgCO_3$—50% thru 100 mesh 1.50

90% thru 4 mesh, cu. yd. 1.35

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$—90% thru 4 mesh 1.00

Columbia, Ill., near East St. Louis—½-in. down ..... 1.25@1.80

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh ..... 1.80@3.80

Elmhurst, Ill. — Analysis, 35.73% $CaCO_3$,, 20.69% $MgCO_3$—50% thru 50 mesh 1.25

Greencastle, Ind. — Analysis, 98% $CaCO_3$—50% thru 50 mesh 2.00

Kansas City, Mo.—50% thru 100 mesh 1.50

Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh 1.40

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—90% thru 50 mesh 2.00

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; pulv. limestone; 70% thru 100 mesh; 60% thru 50 mesh; 100% thru 10 mesh; sacks 4.50

Bulk 3.00

Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$—40.8% thru 100 mesh, 61.2% thru 50 mesh ..... 1.40@1.50

Mitchell, Ind. — Analysis, 97.65% $CaCO_3$, 1.76% $MgCO_3$ — 90% thru 100 mesh 1.25

Montrose, Ia.—90% thru 100 mesh 1.25

Narlo, Ohio—Analysis 56% $CaCO_3$, 43% $MgCO_3$, limestone screenings, 37% thru 100 mesh; 55% thru 50 mesh; 100% thru 4 mesh ..... 1.50@2.00

Ohio (different points), 20% thru 100 mesh; bulk ..... 1.25@1.50

Piqua, O.—90% thru 100 ..... 3.25@5.00

40% thru 100 ..... 1.75@2.00

100% thru 4 ..... 1.25

River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@1.40

Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ½-in. mesh 1.30

Stone City, Ia.—Analysis, 98% $CaCO_3$ 50% thru 50 mesh ..... .75

(Continued on next page)

Agricultural Limestone

(Continued from preceding page.)

Toledo, Ohio—¼-in. to dust, 20% thru 100 mesh ..... 1..0
Waukesha, Wis.—No. 1 kiln dried 2.00
No. 2 Natural 1.75
Chasco, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$—90% thru 100 mesh.... 5.00
90% thru 50 mesh 1.35
Yellow Springs Ohio—Aanlysis 96.08% $CaCO_3$, 63% $MgCO_3$, 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk.... 4.25

SOUTHERN:

Alderson, W. Virginia—Analysis 90% $CaCO_3$; 90% thru 50 mesh 1.75
Cape Girardeau, Mo. — Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$ — 50% thru 100 mesh 2.00
90% thru 4 mesh 1.50
Cartersville, Ga.—Analysis, 55% $CaCO_3$, 42% $MgCO_3$—all passing 10 mesh..... 2.00
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$—90% thru 100 mesh, 4.00; 50% thru 100 mesh, 3.00; 90% thru 50 mesh, 3.00; 50% thru 50 mesh, 2.75; 90% thru 4 mesh, 2.75; 50% thru 4 mesh 2.75
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$—90% thru 50 mesh 1.75
Hot Springs, N. C.—50% thru 100 mesh, sacks, 4.25; bulk 3.00
Knoxville, Tenn.—90% thru 100 mesh; bulk 2.70
Ladds, Ga.—90% thru 50 mesh 2.00
Linnville Falls, N. C.—Analysis, 53% $CaCO_3$; 42% $MgCO_3$—50% thru 100 mesh; 2.50 per ton bulk, 3.50 per ton mesh 200-lb. burlap; crushed limestone, ⅜ down, including dust, 1.00; 1 to ¾, 1.60; 2-in. and less 1.40
Mountville, Va. — Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—X thru 20 mesh; sacks 5.00

WESTERN:

Colton, Calif.—Analysis, 95% $CaCO_3$, 2-4% $MgCO_3$—all thru 14 mesh—bulk 4.00
Garnett, Okla.—Analysis, 86% $CaCO_3$, 50% thru 4 mesh ..... .50
Kansas City, Mo., Corrigan Sid'g—50% thru 100 mesh; bulk 1.80
Tulsa, Okla.—90% thru 4 mesh ..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Baltimore, Md. 2.25
Berkley Springs, W. Va. ..... 1.75@2.00
Cedarville and South Vineland, N. J.—Damp, 1.75; dry 2.25
Cheshire, Mass. ..... 5.00@8.00
Columbus, Ohio—Glass sand 1.50
Dunbar, Pa.—Damp 2.00
Falls Creek, Pa. 2.50
Hancock, Md.—Damp ..... 1.25@1.75
Klondike and Pacific, Mo. ..... 1.75@2.50
Mapleton, Pa. ..... 2.00@2.25
Massillon, Ohio 3.00
Michigan City, Ind.—Glass sand ..... .40@ .45
Mineral Ridge, O. 2.50
Green 2.25
Montoursville, Pa. 1.75
Oregon, Ill.—Glass sand ..... 1.25@1.75
Ottawa, Ill. ..... .75
Pittsburgh, Pa.—Dry, 4.00; damp 3.00
Rockwood, Mich. 2.50
Round Top, Md.—Dry 1.25
San Francisco, Cal. ..... 3.00@3.50
St. Mary's, Pa. 2.25
Thayers, Pa. 2.00
Utica, Ill. ..... 1.00@1.25
Zanesville, Ohio ..... 2.00@2.50

FOUNDRY SAND:

Albany, N. Y.—Sand blast 4.00
Molding fine and brass molding 2.00
Molding coarse 1.75
Allentown, Pa.—Core and molding fine 1.50@1.75
Arenzville, Ill.—Molding fine ..... 1.20@1.60
Beach City, O.—Core, washed and screened ..... 2.00@2.50
Furnace lining ..... 2.50@3.00
Molding fine and coarse ..... 2.25@2.50
Cheshire, Mass.—Furnace lining, molding, fine and coarse 5.00
Sand blast ..... 5.00@8.00
Stone sawing 6.00
Cleveland, O.—Molding coarse ..... 1.50@2.00
Brass molding ..... 1.50@2.00
Molding fine ..... 1.50@2.25
Core ..... 1.25@1.50
Columbus, Ohio—Core ..... .40@.75
Sand blast ..... 3.50@5.00
Furnace Lining 1.75
Molding fine 2.00
Molding coarse ..... 1.25@1.75
Stone sawing 1.50
Traction ..... .75
Brass molding 2.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	**.75**	**.75**	**.75**	**.60**	**.60**	**.60**
Ambridge and So. Heights, Pa.	1.15	1.15	1.15	1.15	.70	.70
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		.65		.90	1.00	
Farmingdale, N. J.	**.48**	**.48**	**1.00**	**1.00**	**1.20**	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		**.50**	**1.75**	**1.35**		**1.25**
Machias, N. Y.	.95	.95	1.25	.85	.85	.85
Pittsburgh, Pa.	**1.15**	**1.15**	**1.15**	**1.15**	**.70**	**.70**
Portland, Maine		.50	1.75		1.35	1.35
Washington, D. C. (rewashed, river)	**.75**	**.75**	**1.60**	**1.40**	**1.20**	**1.20**
CENTRAL:						
Alton, Ill.		.85				.90
Anson, Wis.	.40	.40				.70
Barton, Wis.	.60	.60	.70	.70	.70	
Beloit, Wis.		.50			.50	
Chicago, Ill.		1.75@2.23	1.75@2.43			.90
Cincinnati, Ohio	.70	.65	.90	.90	.90	.75
Columbus, Ohio	.75	.75@1.00	.65@1.00	.75@1.00	.75@1.00	**1.50**
Des Moines, Ia.	**.50**	**.40**	**1.50**	**1.50**	**1.50**	**.95**
Detroit, Mich.	.65	.65	.95	.95	.95	
Earlestead (Flint), Mich.	.70		60-40 sieves, .85; Pebbles, .95			.90
Eau Claire, Wis.	.40@ .50	.40	1.25	1.00		**.50**
Elkhart Lake, Wis.	.56	.40	.66	.50	.50	
Ft. Dodge, Ia.		1.22		2.17		.70
Grand Rapids, Mich.		**.50**		**.80**		**.65**
Greenville, Mechanicsburg, O.	**.65**	**.65**	**.65**	**.65**	**.65**	
Hamilton, Ohio		**.90**			**.90**	
Hawarden, Ia.		.50			1.60	
Hersey, Mich.					.70	
Indianapolis, Ind.	.60	.60		**1.50**	**.75@1.00**	**.75@1.00**
Janesville, Wis.		**.65@ .75**			**.65@ .75**	
Libertyville, Ill.		**.50**		**.70**		
Mankato, Minn.—Pit run	.50	.40			1.25	
Mason City, Ia.	.65	.55	1.70	1.60	1.55	1.55
Milwaukee, Wis.	**1.06**	**1.06**	**1.26**	**1.26**	**1.26**	
Minneapolis, Minn.	**.35**	**.35**	**1.25**	**1.25**	**1.25**	**1.25**
Moline, Ill.	**.60**	**.60**	**1.20**	**1.20**	**1.20**	**1.20**
St. Louis, Mo., f. o. b. cars	1.10	1.30	1.50	1.30	1.25	
St. Louis, Mo., delivered on job	**2.05**	**2.20**	**2.35**	**2.15**		**2.10**
Summit Grove, Clinton, Ind.	.65@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75
Terre Haute, Ind.	.75	.75	.75	.85	.75	.75
Waukesha, Wis.	.50	All other sizes, .70 per ton				
Winona, Minn.	.40	.40	1.25	1.10	1.10	1.10
Yorkville, Sheridan, Moronts, Oregon, Ill.	.60	.50@ .70		.60@ .80	.50@ .70	.60
SOUTHERN:						
Alexandria, La.		**.70**			**1.20@1.35**	
Birmingham, Ala	1.48	all gravel—1.88				
Charleston, W. Va.		**1.40**				**1.50**
Estill Springs, Tenn.	**1.35**	**1.15**		**1.00**	**.85**	**.65**
Ft. Worth, Tex.		2.00		2.00		2.00
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	.75	1.00	1.50	1.50	1.50	1.50
Lake Weir, Fla.		60				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	**1.12**	**1.12**				**1.95**
N. Martinsville, W. Va.		1.00		1.20		.80
New Orleans, La.		.50			1.00	
Pine Bluff, Ark.	**1.20**	**.90**	Washed gravel, all sizes, 2.25			
Roseland, La.		**.25**	**.85**	**.85**		
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	80	.80
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton. Missouri River, .85)					
Los Angeles, Calif.		1.00		1.50	1.50	
Pueblo, Colo.	1.10*	.90*			1.50	
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*		1.00*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch	Sand, ¼ inch	Gravel, ½ inch	Gravel, 1 inch	Gravel, 1½ inch	Gravel, 2 inch
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, 1.00 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dudley, Ky. (Crushed Sand)	1.00	1.00		.90		
East Hartford, Conn.			.65 per cu. yd.			
Estill Springs, Tenn.						.85
Fishers, N. Y.		.50@ .70		.50@ .60		
Hamilton, Ohio			.45 per cu. yd. in pit			
Hartford, Conn.		1.00*				
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Tex.					.55	.55
Janesville, Wis.		.65			.65@ .75	
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.		.75				
Saginaw, Mich., f.o.b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.			60% gravel, 40% sand, 1.40			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Tex.		.80		1.50		1.30
Winona, Minn.			Clean pit run .70			
York, Pa.		.95@1.20		(crushed rock sand)		

*Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.50	1.35	1.25	2.15	2.15
Eastern Pennsylvania and Northern New Jersey	2.00	1.20	1.50	1.20	1.20	1.20	1.20
Easton, Pa.	2.00	.80	1.25	.90	.90	.90	.90
Erie, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.			1.25	1.25	1.25	1.25	1.25
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.00	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, 1.50, F. O. B. Chicago				
Detroit, Mich.			All sizes, 1.65, F. O. B. Detroit				
Ironton, O.	2.05		Other grades 1.45				
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.92	1.67	1.77	1.77	1.77	1.67	1.67
		(Any delivery in city except team track deliveries)					
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
Steubenville, Lowellville and Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton & Low Moor, Roanoke, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

EASTERN	Finishing Hydrate	Masons' Hydrate	Agricultural Hydrate	Chemical Hydrate	Ground Burnt Lime Blk.	Ground Burnt Lime Bags	Lump Lime Blk.	Lump Lime Bbl.
Bellefonte, Pa.			8.00	9.00	8.00	.....	7.00	.....
Berkley, R. I.			12.00		.....	.....	.....	2.30
Buffalo, N. Y.	10.50	9.00	8.50@11.00	11.00	7.25	9.25	8.00	1.50
Chaumont, N. Y.					2.50	4.00	.....	.....
Lime Ridge, Pa.					.....	.....	5.00	.....
West Rutland, Vt.	13.50@14.00	11.00@11.50	11.00@11.50	13.50	10.00	.....	11.00	3.50
West Stockbridge, Mass.							.....	2.25
Williamsport, Pa.			10.00		.....	10.00	6.00	.....
York, Pa. (dealers' prices)		10.50	10.50	11.50	.....	.....	8.50	1.65*
Zylonite, Mass.	3.20d		2.90d	7.00	.....	.....	.....	.....
CENTRAL:								
Cold Springs, Ohio	10.50	9.00	8.50		7.25	9.25	8.00	.....
Delaware, Ohio		9.50	8.50	10.50	.....	.....	8.00	1.50
Gibsonburg, Ohio	10.50		8.50		7.25	9.25	8.00	.....
Huntington, Ind.	10.50	9.00	8.50		.....	.....	8.00	1.70*
Luckey, Ohio	10.50	9.00	8.00		.....	.....	8.00	.....
Marblehead, Ohio	10.50	9.00	8.50		.....	.....	8.00	1.50*
Mitchell, Ind.		11.00	11.00	11.00	9.50	.....	8.50	1.45
Sheboygan, Wis.							.....	7.50d
White Rock, Ohio	10.50	9.00	8.50	11.00	7.25	9.25	8.00	1.50
Woodville, O. (dlrs.' price)	10.50	9.00	8.00	10.00	7.25	.....	8.00	1.50
SOUTHERN:								
Erin, Tenn.					.....	.....	6.00	1.00
Karo, Va.					.....	.....	7.00	1.30
Knoxville, Tenn.	22.00	9.50@11.00	9.50	10.50	.....	.....	7.50	1.30
Ocala and Zuber, Fla.	12.50			12.00	.....	.....	11.00	1.65
Sherwood, Tenn	11.00	9.50			7.50	.....	7.50	.....
Staunton, Va.					7.00	8.00	7.50b	1.40
WESTERN:								
Colton, Calif.			15.00		.....	.....	19.70	.....
Kirtland, N. Mex.					.....	.....	12.50	.....
San Francisco, Calif.	22.00	22.00	15.00	22.00	.....	.....	.....	2.15*
Tehachapi, Calif.					.....		13.00	2.00

‡100-lb. sacks; *180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; §Paper sacks. (a) 50-lb. paper bags; terms, 30 days net; 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice. (b) Burlap bags. (c) 200-lb. bbl. (d) 280-lb. bbl. net.

Miscellaneous Sands

(Continued from preceding page)

Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.15
Dresden, O.—Core and traction	1.00
Molding, fine and coarse	1.25
Brass molding	1.50
Dunbar, Pa.—Traction, damp	2.00
Dundee, O.—Glass, core, sand blast, traction	2.50
Molding fine, brass molding (plus 75c for winter loading)	2.00
Molding coarse (plus 75c for winter loading)	1.75
Eau Claire, Wis.—Core	1.00
Sand blast	3.25@3.75
Falls Creek, Pa.—Molding, fine and coarse	1.75
Sand blast	3.00
Traction	1.75
Franklin, Pa.—Core	1.25@1.75
Furnace lining	2.50
Molding fine	2.00
Molding coarse	1.75
Brass molding	2.00
Greenville, Ill.—Molding coarse	1.00@1.40
Joliet, Ill.—Milled, dried and screened No. 2 coarse molding sand and open hearth loam and luting clay	.60@ .80
Kansas City, Mo.—Missouri River core	.80
Kasota, Minn.—Molding coarse and fine, stone sawing (pit run)	1.75
Klondike, Pacific and Gray Summit, Mo.—Molding fine and core	1.75@2.00
Mapleton, Pa.—Core, furnace lining, molding fine and coarse	1.75
Massillon, O.—Traction, molding fine and coarse, furnace lining, core	2.25
Michigan City, Ind.—Core, traction	.40@ .45
Mineral Ridge, Ohio—(Green) core	2.25
Furnace lining, molding fine and coarse, roofing, sand blast, stone sawing and traction, brass molding	2.00
Montoursville, Pa.—Core	1.50@1.75
Traction	1.00@1.25
Molding fine	1.50
Molding coarse	1.50@2.00
New Lexington, O.—Molding fine	2.00
Molding coarse	1.75
Oregon, Ill.—Core, furnace lining, roofing sand	1.25@1.75
Sand blast	2.50@3.50
Stone sawing	2.00@3.00
Traction, brass molding	1.25
Ottawa, Ill.—Core, furnace lining, molding fine and coarse (crude silica sand)	.75@1.00
Ottawa, Minn.—All crude silica sand	.75@1.25
Pelzer, S. C.—Glass sand (carload lots only)	.70
Rockwood, Mich.—Core, damp	2.00
Roofing	2.50
Sand blast	3.75

Miscellaneous Sands

(Continued)

Round Top, Md.—Glass sand	1.75@2.00
Core, furnace lining	1.45
Traction	1.60
(All per 2000 lbs.)	
San Francisco, Cal. (Washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@3.50
Direct from pit.	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
Thayers, Pa.—Core	1.75
Furnace lining	1.00
Molding fine and coarse	1.25
Traction	1.75
Utica, Ill.—Core	1.00
Furnace lining	1.00
Molding fine	.75
Roofing coarse	.90
Stone sawing	1.00@2.50
Utica, Pa.—Core	1.25@2.25
Molding fine and coarse, traction, brass molding	2.00
Warwick, O.—Core, furnace lining, molding fine and coarse (damp, 1.75) dry	2.00
Traction, brass molding (dry)	2.00
Zanesville, Ohio—Brass molding and molding fine	1.50@1.75
Molding coarse	1.25@1.50

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Asheville, N. C.—Ground talc (150-200 mesh), 200-lb. bags, per ton	8.00@14.00
Pencils and steel workers' crayons, per gross	1.25@ 2.50
Tailors' chalk, per gross	1.50
Baltimore, Md.—Ground talc (20-50 mesh), bags	10.00
Ground talc (150-200 mesh), bags	14.00
Cubes	50.00
Blanks (per lb.)	.07
Chatsworth, Ga.—Crude talc	7.00
Ground talc (150-200 mesh); bags	12.00
Pencil and steel workers' crayons	1.50@ 2.50
Chester, Vt.—Ground talc (150-200 mesh), bulk	7.50@ 9.00
Emeryville, N. Y.—200-325 mesh; bags	14.75
Glendale, Calif.—Ground talc (150-200-mesh)	16.00@30.00
(Bags extra)	
Ground talc (50-300 mesh)	13.50@15.50
200 mesh	13.50@14.50
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	2.75@ 3.50
Ground talc (20-50 mesh)	5.50@ 7.75
(150-200 mesh) bags	8.25@10.50
Johnson, Vt.—Ground talc (20-50 mesh), bulk 7.50; (150-200 mesh)	8.00@15.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags extra)	
Los Angeles, Calif.—Ground talc (200 mesh) (includ. bags)	16.00@20.00
Mertztown, Pa.—Ground talc (20-50 mesh); bulk 4.00; bags	5.00
(150-200 mesh); bulk 6.00; bags	7.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	8.50@15.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	7.50
(Bags 1.00 extra)	
Ground talc (150-200 mesh), bulk	9.00@14.00
(Bags 1.50 extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

Raw Rock

Per 2240-lb. Ton

Centerville, Tenn—B.P.L. 72% to 75%	6.00@8.50
B.P.L. 65%	6.00
Gordonsburg, Tenn—B.P.L. 70%-72%	4.00@5.00
Tennessee—F. o. b. mines, long tons, unground Tenn. brown rock, 72% B. P. L.	7.00
Mt. Pleasant, Tenn.—Analysis, .70 B.P.L. (2000 lbs.)	6.50
Montpelier, Idaho—70% B.P.L.—Crude	4.75
Crushed 2-in. ring and dried	5.00
Paris, Idaho.—2,000 lb. mine run, B.P.L. 70%	4.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$ 9.30	$8.40	$8.10	$7.80
24x14	9.30	8.40	8.10	7.80
22x12	10.80	8.70	8.40	9.10
22x11	10.80	8.70	8.40	9.10
20x12	10.80	8.70	8.40	9.10
20x10	11.70	9.00	8.70	8.40
18x10	11.70	9.00	8.70	8.40
18x 9	11.70	9.00	8.70	8.40
16x10	11.70	8.40	8.40	8.10
16x 9	11.70	8.40	8.40	8.10
16x 8	11.70	8.40	8.40	8.10
18x12	11.10	8.70	8.40	8.10
16x12	11.10	8.70	8.40	8.10
14x10	11.10	8.40	8.10	7.80
14x 8	11.10	8.40	8.10	7.80
14x 7 to 12x6	9.60	8.40	8.10	.....
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$7.50	$7.20	$5.75
22x11	8.40	7.80	7.50	5.75
Other sizes	8.70	8.10	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.
Granulated slate per net ton f. o. b. quarries, Vermont and New York, 7.50.

(Continued from preceding page)

Ground Rock

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. Ton	
Barton, Fla. — Analysis, 50% to 65% B.P.L.	3.50@6.00
Centerville, Tenn.—B.P.L. 65%	6.00
B.P.L. 75% (brown rock)	12.00
Columbia, Tenn.—B.P.L. 68% to 72%	5.50
B.P.L. 65% (90% thru 200 mesh) bulk	5.50
Morriston, Fla.—Analysis, 35% B.P.L.	12.00
Mt. Pleasant, Tenn.—B.P.L. 70%	7.00

Florida Soft Phosphate

Raw Land Pebble

	Per Ton
Bartow and Norwills, Fla.—B.P.L. 50%, bulk	6.00@ 8.00
B.P.L. 78%, bulk	13.50
Florida—F. o. b. mines, long ton, 68/66% B.P.L.	3.00
68% (min.)	3.25
70% (min.)	3.50
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

	Per Ton
Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Lakeland, Fla.—B.P.L. 60%	6.00
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.	5.00@ 6.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	12.00@16.00	10.00@12.00
Slate granules		7.00@8.00
Granville, N. Y. — Red slate granules		7.50
Ingomar, Ohio	12.00@25.00	12.00@25.00
Lincoln, Neb. — Red, white, gray, in bags		30.00
granite; sacks	28.50@30.00	20.00@22.50
Milwaukee, Wis.		30.00
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsb'g, N. J.—Green stucco dash		9.00@14.00
Piqua, O.—Marble		7.00@ 9.00
Poultney, Vt. — Roofing granules		3.75
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.	12.00	14.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b., bags		
10c extra	5.00	5.00

Concrete Brick

Prices given per 1,000 brick, f. o. b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@35.00
Bellows Falls, Vt.	18.00	25.00@35.00
Birmingham, Ala.	13.50	25.00@35.00
Carpenterville, N. J.	15.50	35.00
Easton, Pa.	16.00	40.00@60.00
Eugene, Ore.	25.00@26.00	50.00@75.00
Rochester, N. Y.	21.00	
Friesland, Wis.	20.00	
Houston, Tex.		19.50
Lockport, N. Y.	16.00	
Omaha, Neb.	18.00	30.00
Piqua, O.	15.00	25.00
Portland, Ore. (Del'd)	21.00	30.00@60.00
Puyallup, Wash.	18.00	30.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@40.00
Salem, Ore.	25.00	35.00@100.00
Salt Lake City, Utah	17.00@18.00	35.00@40.00
Seattle, Wash.	18.00@22.00	35.00@75.00
Springfield, Ill.	18.00	25.00@25.00
Tampa, Fla.	15.00	25.00@65.00
Wauwatosa, Wis.	13.00@14.50	28.00@65.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	7.00
Barton, Wis.	10.00
Boston, Mass.	15.00
Brighton, N. Y.	14.75
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
El Paso, Texas	12.00
Grand Rapids, Mich.	12.50
Lancaster, N. Y.	12.75
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.50
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Redfield, Mass.	15.00
Rives Junction, Mich.	11.00
Saginaw, Mich.	11.50
San Antonio, Texas—Common	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	18.00
F. o. b. cars	16.00
Washington, D. C.	13.50
Winnipeg, Can.	17.00@25.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	19.00	16.00
Baltimore, Md.	15.00	13.00
Boston, Mass.	23.00	20.00
Cincinnati, Ohio	19.60	14.50
Chicago, Ill.	18.00	.....
Dallas, Tex.	25.00	.....
Denver, Colo.	30.00	.....
Detroit, Mich.	15.25	13.25
Fort Dodge, Ia.	19.70	17.00
Grand Rapids, Mich.	15.65	.....
Los Angeles, Calif.	30.00	30.00
Minneapolis, Minn.	29.00	22.00
Montreal, Que.	21.00	21.00
New Orleans, La.	.....	17.25
New York, N. Y.	16.99	.....
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	18.00
Seattle, Wash.	27.00	.....

	Lump per 180-lb. Barrel (net) Finishing	Common
Atlanta, Ga.	2.00	1.50
Baltimore, Md.	.....	12.00†
Boston, Mass.	3.35	3.10
Cincinnati, Ohio	.....	12.25
Chicago, Ill.	.....	1.40
Denver, Colo.	.....	2.95
Detroit, Mich.	11.50†	10.50†
Los Angeles, Calif.	3.00*	3.00*
Minneapolis, Minn.	1.70	1.40
New Orleans, La.	.....	1.75
New York, N. Y.	.....	3.69*
St. Louis, Mo.	.....	.70*
San Francisco, Calif.	.....	1.90
Seattle, Wash.	3.25	2.75
Sheboygan, Wis.	.....	10.00

*280-bbl. (net). †Per ton.

Portland Cement

Current prices per barrel in carload lots, f. o. b. cars, without bags.

Atlanta, Ga. (bags)	3.45
Boston, Mass.	2.61
Cedar Rapids, Iowa	2.33
Cincinnati, Ohio	2.39
Cleveland, Ohio	2.31
Chicago, Ill.	2.05
Dallas, Tex.	2.25
Davenport, Iowa	2.28
Denver, Colo.	2.65
Detroit, Mich.	2.33
Duluth, Minn.	2.14
Indianapolis, Ind.	2.26
Kansas City, Mo.	2.30
Los Angeles, Calif.	3.06
Milwaukee, Wis.	2.22
Minneapolis, Minn.	2.39
Montreal, Can. (sacks 20c extra)	2.40
New Orleans, La.	2.80
New York, N. Y. (includes bags)	2.40
(10c per bbl. discount in 10 days)	
Pittsburgh, Pa.	2.09
Portland, Ore.	3.05
St. Louis, Mo.	2.10
San Francisco, Calif.	2.63
St. Paul, Minn.	2.39
Toledo, Ohio	2.33
Seattle, Wash.	2.90

NOTE—Add 40c per bbl. for bags.

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	Plaster Board ⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10", 1850 lb. Per M Sq. Ft.
Douglas, Ariz.	.....	.....	6.00	13.00	.....	10.50@12.00	.....	.....	.....	11.50@13.50	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	.....	6.00	8.00	10.00	10.00	.....	.....	31.25	21.00	19.38	20.00	30.00
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Rapid City, S. D.	4.00	.....	.....	10.00	12.00	12.50	.....	.....	33.75	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	15.00	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Jute Bags, 15c each, $3.00 per ton; Paper Bags, $1.00 per ton extra.
*Shipment in bulk 25c per ton less; ‡Bond plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton additional; ||Bulk; (a) Includes sacks.

News of All the Industry

Incorporations

The Shell Rock Lime Co., Newbern, N. C., has been incorporated for $50,000 by E. H. Meadows, W. B. R. Guioux.

The Billings Sand & Gravel Co., Billings, Mont., has been incorporated for $50,000 by J. F. Clark, W. W. Givens, and others.

The Saxton Shale Brick and Tile Co., Wilmington, Del., has been incorporated for $100,000. The attorney is L. E. Wales.

The Dominion Sand and Gravel Co. has been incorporated for $50,000 in Cleveland by J. M. McSweeney and Edith I. Pierson.

The Arnoste Marble Co., Carthage, Mo., has been incorporated for $50,000 by A. Arnoste, K. D. Steadley and T. C. Pennington.

The Carolina Crushed Stone Co., Charlotte, N. C., has been incorporated for $15,000 by L. C. Hunter, H. J. Dunavant and U. N. Cullum.

The Leesburg Sand and Supply Co. has been incorporated at St. Petersburg, Fla., for $10,000 by C. L. Raymond, president, and R. W. Smith, secretary and treasurer

The Waverly Gravel and Tile Co., Waverly, Iowa, has been incorporated for $40,000 by S. W. Furrows, W. M. Brooks, L. H. Racker, D. A. Mether and W. Holst

The Star Sand Co., New York, N. Y., has been incorporated for $25,000 by C. E. Frankenberry, Phil Kussart, Pittsburgh, and T. J. Chantler, Beaver, Pa.

The Lyon Granite Co., Barre, Vt., has been incorporated for $15,000, by A. Scampani, P. Scampani, A. Columbo, G. Braggi, P. Crugnola, S. Molina and J. Arioli, all of Barre.

The Structural Gypsum Corp., Richmond, Va., has been incorporated for $10,000 by J. Myshrall, president, Bloomfield, N. J., and John R. Williamson, Secretary, Ramsey, N. J.

The Billings Sand and Gravel Co., Billings, Mont., has been incorporated for $50,000 by J. M. McElroy, W. W. Givens, F. B. Connelly, J. F. Clark and B. R. Davis, all of Billings.

Dealers

The L. A. Pettibone Co., Minneapolis, Minn., has been incorporated for $50,000 to handle building materials.

The Roscoe Sand and Gravel Co., has been incorporated at Los Angeles, Calif., for $50,000 and will manufacture building material.

The Adjavant Roofing Manufacturing Co., 307 Chelsea National Bank building, Atlantic City, N. J., has been incorporated for $125,000 and will deal in roofing materials.

The McKelvey Pulverizer Co., Inc., 136 W. Lake St., Chicago, Ill., has been incorporated and will manufacture and pulverize and deal in sand, silica, etc. Incorporators are H. V. Grezsang, D. McKelvey and J. Neuberger.

The Kissam-Harris-Newell Co., Formosa, Fla., has been incorporated for $25,000 by F. W. Kissam, president; J. H. Harris, vice-president, and S. P. Newell, secretary, all of Orlando, Fla., and will engage in building materials business.

The Maurice Chemical Co., Baltimore, Md., has been incorporated with D. E. Collins, 1427 Washington boulevard, as president, and will manufacture high temperature furnace cements, and will install sand and cement mixers, bagging equipment, etc.

Sand and Gravel

The Estill Sand and Gravel Co., Louisville, Ky., has increased its capital stock to $35,000.

R. A. Gibson, Shreveport, La., has under construction a gravel plant in Little River, Ark.

The Chilson Sand and Gravel Co., has been incorporated in Detroit, Mich., for $10,000, with headquarters at 3974 Lincoln avenue.

The Rye Brothers Co., Sault Ste. Marie, Mich., has changed its name to the Soo Sand and Gravel Co.

The Coucho Washed Sand Co., Oklahoma City, Okla., has been incorporated for $10,000 by M. C. Rae, M. Hess and H. D. Bland.

The Cadwell Sand and Gravel Co., Windsor, Mich., has secured the contract to deliver 40,000 yd. of ballast for the Pere Marquette Railway. The gravel will be delivered by boat.

Charles Atkinson, Dixon, Ill., has purchased of H. U. Bardwell the modern gravel grading equipment recently installed in the Bardwell pit and has leased for a number of years the property from Mr. Bardwell.

The Standard Sand and Gravel Co., formerly of New Martinsville, W. Va., has moved its equipment to Wheeling, W. Va., where it now has in operation a large dredge, several large travelling cranes, and barges. The advantages offered at Wheeling induced the company to move its floating material to this location.

The Raritan Sand Company, New York, N. Y., has placed a first mortgage of $150,000 for five years on the property at the southwest corner of Madison Ave. and 53rd St.; also $26,000 at 5½ per cent for H. Kallman on 507 W. 179th St. and for L. Amsterdam and others $45,000 at 5½ per cent for five years on 1493 and 1495 Madison Ave.; also $12,000 at 6 per cent for five years on 118 W. 85th St. for A. McDougall.

Quarries

The Lafayette Slate Quarry Co., Inc., Sussex, N. J., manufacturers of slate roofing is meeting with much success under new management.

Clovis, Calif.—The Blanchard Granite quarry at Academy is again running full force after having been closed for several weeks. B. D. Hinds is foreman.

The Burke Stone Co., Inc., has removed its Scarsdale office to its new location on Popham road, corner Chase road. The office is in charge of E. J. Bouchoux.

The General Crushed Stone Co., Little Falls, N. Y., has been awarded the contract to furnish 1760 cu. yds. of crushed stone and 700 yards of screening to be used in town and county road repairs.

The Sterling Stone and Lime Co., Delaware, Ohio, recently incorporated for $250,000 have begun boring on the 300-acre tract of land under option. The stone is especially suited for railway ballast and for highway and concrete construction. H. E. Culbertson, Cleveland, is president; J. T. Herrick, Delaware, vice-president and general manager; C. C. McCandish, Columbus, secretary and treasurer and C. M. Herrick, Columbus, chief engineer and superintendent.

Bloomington, Ind.—Robert Reed, Bedford, has purchased the 80-acre farm of Frank Ridge, just north of the Consolidated Stone Co., for $15,000, and has ordered $20,000 worth of quarry equipment for opening another large stone quarry in the Bloomington stone district. This ground shows a good ledge of fine high grade building stone. The company will be operating the new quarry within thirty days, as the rush orders now in hand are large enough to keep shipments going for the whole summer. Another big stone deal was consummated when Joseph Shireman and J. M. Wampler, Martinsville, and David Baker and H. C. Heckett, Indianapolis, who are opening a large new stone quarry on the Wampler land, east of Ellettsville, purchased the equipment and the cut stone plant of the Romona Stone Co., and that company's plant at Stinesville. The Romona Co.'s equipment will be moved immediately to the new quarry.

Personal

Martin A. Hotham, formerly superintendent of the Grove City Limestone, Grove City, Pa., has resigned that position.

John Mutte is now president and W. B. Stuart is secretary and treasurer of the Washington Marble Products Co., in Chewelah, Wash.

Thomas J. Wasser, chief engineer of the state highway department of New Jersey, was recently elected president of the American Road Builders' Association

Dr. Oliver Bowles, mineral technologist of the United States Bureau of Mines, has been elected a member of the Institution of Quarry Managers of England.

C. M. Reed has been made production manager of the Quality Cement Products Co., Medford, Minn. He was formerly drainage engineer of Worth county, Iowa.

W. P. Carmichael, president of the Carmichael Gravel Co., was re-elected president of the Winona Assembly and Bible Conference at the annual session of that body at Lake Winona, Ind., on August 18.

Fred Kellam has resigned as testing engineer of the Indiana Highway Commission. He will be associated with S. G. Spink, of Indianapolis, in the manufacture of concrete blocks and trim stone. Mr. Kellam's first assistant T. D. Meisenhelder, has been appointed testing engineer for the commission.

J. Thompson Brown has been appointed general manager of the explosives department of E. I. DuPont de Nemours & Co., Wilmington, Del., to succeed the late Charles A. Patterson. Mr. Brown was first employed by the company in 1903 and has been engaged in plant engineering and special and general operating work at the high explosives plants. He has held the positions of secretary to assistant director, manager of dynamite works, general superintendent of the high explosives division and finally assistant general manager of the department. He is a graduate of Virginia Polytechnic Institute and also took a course in engineering at Cornell University.

Henry Harnischfeger, president Pawling & Harnischfeger Co., Milwaukee, has returned from a business and recreation tour of the Far East, lasting six months. He visited Japan, China, the Philippines, India and other foreign countries with the primary object of investigating business conditions and possibilities with special reference to gasoline-driven excavating units manufactured. He witnessed the operation of one of the large type of excavators on the Imperial Japanese Railways by the Musashi Engineering Corp. Mr. Harnischfeger said that, contrary to the general opinion, there is a growing market in the Far East for labor-saving machinery of all kinds.

Trade Literature

Stokers—Bulletin No. 294 of the B. F. Sturtevant Co., Hyde Park, Boston, Mass., describes and illustrates this company's underfeed stoker, its principles, economies and adaptation to the conditions to be met in underfeeding fuel to a furnace.

Gears and Pinions—"Tools, steel gears and pinions" for mining locomotives and machines contains the latest announcements of the Tool Steel and Pinion Co., Cincinnati, included are locomotives, pumps, machine parts, instructions for ordering and for figuring dimensions, storage battery locomotives, etc.

Pit and Quarry Equipment—The Western Wheeled Scraper Co., Aurora, Ill., shows the adaptability of its equipment to pit and quarry work in a 16-page booklet illustrated with photographs of its scrapers, dump cars, elevating graders, dump wagons and carts, road and railroad plows, jaw crushers and gravel-screening plants. The text deals with operating methods at specific installations.

Transformers—The single-phase distribution and power transformers manufactured by the Kuhlman Electric Co., Bay City, Mich., are described in Bulletin No. 111. The windings, insulation, elimination of short circuits, core and case construction are all treated in this bulletin. Bulletin 112 is devoted to three-phase distribution and power transformers and contains ample descriptive matter and illustrations setting forth the application of these machines.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion

FOR SALE

2 8x110′ Rotary Kilns
6 5x6x7x110′ Rotary Kilns
8 5x21′ Tube Mills, Steel Lining
6 250 H.P. Oil City Water Tube Boilers
1 4′ 6″ x 40′ Coal Dryer
1 5′ x 46′ 6″ Rock Dryer
1 No. 5 Gates Crusher
8 Krupp Ball Mills
4 Engines, 200 to 500 H.P.
8 33″ Fuller Mills

Shafting, Pulleys, Bearings and Elevator Equipment, all in first-class operating condition.

50 Acres of Land and Five Buildings, Stone and Steel Construction.
Located at Stockertown, Pa.

ENGINEERING SALES COMPANY, Nashville, Tenn.
OLLIE LAWRENCE, Stockertown, Pa.

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½ x25′, 4x30′, 5½x50′, 6x60′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 4x40′, 5x50′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8″, 6x5′, 5x4′, 3x3½′ pebble and ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 12x26″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24″, 36″ and 40″ cage mills; 3′ and 4½′, 6′ and 8′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 5 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36″ Sturtevant emery mill; one 3 roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens; Richardson automatic scales; 8′ and 10′ Emerick air separators.

Air compressors.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

FOR SALE

One (1) No. 6 McCully Crusher rebuilt by us—price $4000.00, with two (2) extra Master Wheels and one extra Shaft and Head. Subject to inspection in our shop and to prior sale.

R. S. NEWBOLD & SON CO.
Norristown, Pa.

FOR SALE

24″ Symons Disc Crusher, never been used.

Breen Stone & Marble Co.
Kasota, Minnesota

Idle Machinery Absorbs Profits

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who will keep it going.

FOR SALE

No. 2 Allis-Chalmers Gates Gyratory Crusher.
No. 3 Austin Gyratory Crusher.
No. 6 Austin Gyratory Crusher.
Two American Process type 24x48″ Rotary Dryers.
50′ continuous steel bucket (8″x16″) and chain elevator.
50′ continuous bucket (7″x13″) and belt elevator.
25 H.P. simple side crank Heilman steam engine.
125 H.P. 18″x24″ side crank Atlas steam engine
75 H.P. 13″x16″ side crank Erie City steam engine.
Lidgerwood Standard double cylinder, two drum, 10″x12″ hoisting or cableway engine.
Two 150 H.P. General Electric Co. Induction motors, voltage 440 or 220, shop numbers 625140 and 1164925.
Williams No. 9 Swing hammer, Universal type pulverizer.
Worthington 10″ intake by 8″ discharge by 20 cylinders steam pump.
25 tons of 40 to 60 lb. rails.
7—2 yard, all steel, 48″ gauge end dump quarry cars.
One Sanderson cyclone No. 14 electric, non-traction well drill and equipment.

ADDRESS
E. W. Cooper, Engineer
174 3rd Ave. No., Nashville, Tenn.

FOR RENT AND SALE

20—12-yd. Western dump cars, std. gauge.
50—60,000-lb. capacity flat and box cars.
1—Western standard gauge spreader.
1—Osgood 18 revolving shovel, traction wheels. No. 794, ¾-yd. bucket, built 1920.
1—Class 14 Bucyrus dragline on caterpillars, 70-ft. boom, 2-yd. bucket, built 1921.
1—Marion 76 steam shovel, No. 3503, std. gauge, weight 110 tons, used 10 months.
2—Foote 1-yd. side discharge concrete mixers, with steam engine and boiler.
64—NEW 20-in. I-beams, 80 lbs. per foot, 40 feet long, not drilled.
1—NEW Lakewood concrete chuting system.
6—NEW wood-burning locomotive-stacks.

LOCOMOTIVES

1—50-ton 18x24-in. six-wheel switcher.
1—40-ton 17x24-in. four-wheel switcher.
2—NEW 24-ton six-wheel Porters, separate tender, 36-in. gauge.
2—18, 14, and 10-ton Vulcans, 36-in. gauge.

INDUSTRIAL EQUIPMENT CO., McCormick Bldg. Chicago, Ill.

WANTED

A second-hand sand and gravel elevator, buckets 16-18″ wide.

Williamsport Sand & Gravel Sales Co.
Williamsport, Penna.

CRUSHING PLANT FOR SALE

1—No. 5 Austin Gyratory Crusher.
1—No. 5 Austin Standard Elevator.
1—32″ Austin Screen.
1—24″x24″ Austin Belt Hoist.
1—10x12, 200′ capacity Sullivan Air Compressor.

T. G. DAVIS
Transportation Building Chicago, Ill.

1—59-ton standard gauge Baldwin 6-wheel saddle tank switcher.
1—40-ton American 4-wheel saddle tank switcher.
2—50-ton standard gauge Brooks 6-wheel switchers.
1—42-ton standard gauge Shay geared locomotive.
2—18-ton 36″ gauge 4-wheel saddle tanks.
2—23-ton new 36″ gauge Porter 6-wheelers, with tenders.
1—20-ton Industrial Loco. Crane.
1—14-B Bucyrus steam shovel, mounted on traction wheels.

BIRMINGHAM RAIL & LOCOMOTIVE CO.
Birmingham, Ala.

IMMEDIATE DELIVERY

SEND US YOUR STEAM SHOVEL INQUIRIES
65x86 in. TRAYLOR JAW CRUSHER.
No. 18K GATES CRUSHER.
50-75 HP. Single Drum Hoists, 25 Cy. Motors.
25-40-50 HP. D.D. Hoists, 60 Cy., 220-440 V., 3 Ph.
Nos. 3-5-6-7½ & 8K CRUSHERS.
6 and 12 ton Gasoline Locomotives.
10x12 in. Steam Hoist, 3 Drum.
2—DISC CRUSHERS, 36″ SYMONS.
2—60 ft. BARBER-GREEN 18″ BELT CONVEYORS.
100 TON 2½ YD. ELEC. SHOVEL.
50 to 5000 ft. Steam, Belt & Elec. Compressors.
JAW and ROLL CRUSHERS.
10-15 & 20 Ton Locomotive Cranes.
13x30 in., 9x14 in. and Other Jaw Crushers.
24x54 McLANAHAN ROLL CRUSHER.
Send us your inquiries for Steam Engine, Centrifugal Pumps, Quarry & Cont. Equip., Etc.
ROSS POWER EQUIP. CO., Indianapolis, Ind.

George Borrowman, Ph.D.
CHEMIST

Analyses, consultations, researches in connection with rock products, cements, clays, lime, plasters, zeolites, sands, etc.

9 So. Clinton St. Chicago, Ill.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

QUARRY EQUIPMENT

4—20 yd. Steel Underframe Side Dump Cars.
3—16 yd. Steel Underframe Western Dump Cars.
10—1½ yd. Western Dump Cars.
2—10x16 Davenport 36 in. ga. Saddle Tanks.
1—11x16 American 36 in. ga. Saddle Tank.
1—9x14 Porter 4 ft. 8½ in. ga. Saddle Tank.
1—⅝ yd. Thew "O" Traction Shovel.

Walter A. Zelnicker Supply Co., St. Louis

New—RAILS—Relaying

All sections on hand for quick shipment Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa.

FOR SALE

One No. 9 Gates Gyratory Crusher in A1 condition.

Santa Cruz Portland Cement Co.
324 Crocker Building
San Francisco, California

Classified Advertising

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

H. E. WIEDEMANN
(Est. 1905)
Consulting and Analytical Chemist
Specialist in Analysis of Rock Products
Chemical Bldg. St. Louis

POSITION WANTED

Superintendent of cement plant. Have 20 years' experience, operation, from foreman to superintendent, including position master mechanic and construction engineer. Highest references.

Box 316, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

SUPERINTENDENT

of large hydrated lime plant desires change of location. Familiar with all branches of operation; can handle large proposition and produce results.

Box 420, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

SUPERINTENDENT

with twenty years' experience in construction and operation of large crushing plants. Quarry operation using steam shovels and modern equipment, also cement mill and pulverizing experience. Good references. Address

Box 1583, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

FOR SALE

92 acres of the purest high calcium limestone in the United States. Located at St. Genevieve, Mo., and adjacent to the Missouri-Illinois R. R. A splendid opportunity for a lime manufacturer that wishes to locate in this locality. Lime from this vicinity has a national demand and a modern lime plant would pay for itself in two years. Address

Mr. J. E. Schuerman
The St. Louis Steel Erection Co.
Syndicate Trust Bldg.
St. Louis, Mo.

KEEP UP WITH THE ROCK PRODUCTS INDUSTRY

TIME and money are saved and won by keeping up with the progress of industry. Changing conditions, methods, prices must be reckoned with to win success. **Rock Products** is the authoritative source of business and technical information in the rock products industry. It is edited from the field by experienced practical men.

Subscribe now and get in correspondence with our service and advisory departments.

F. L. SMIDTH & CO.

50 CHURCH STREET NEW YORK

Engineers

CEMENT MANUFACTURING PLANTS
CEMENT MAKING MACHINERY
PULVERIZED COAL INSTALLATIONS
GRANULATING AND PULVERIZING MACHINES FOR ALL MATERIALS
FLINT PEBBLES—SILEX LINING
THE LENIX BELT DRIVE

WE DESIGN AND EQUIP COMPLETE PLANTS

for the manufacture of gypsum products, such as wall plaster, moulding plaster, wall board products, gypsum block products, also mixing plants.

We are prepared to furnish complete machinery-equipment and design and furnish plans for the installation. Consult our Engineering Department. Forty years' experience in designing of wall plaster machinery and plants.

The J. B. Ehrsam & Sons Mfg. Co.
Engineers, Machinists and Founders
Enterprise, Kansas
Western Sales Representative
J. J. Abramson, 612 San Fernando Bldg., Los Angeles Calif.

Electric Motors and Generators

for all requirements of the Rock Products Industry

BURKE ELECTRIC CO.

Main Office and Works
Erie, Penna.
Service Sales Offices

Buffalo, New York — Cleveland, Philadelphia — Detroit, Pittsburgh

Sales Agencies
Underwood Electric Co., Cincinnati
W. T. Osborn, Kansas City.

Robert W. Hunt Jno. J. Cone D. W. McNaugher

ROBERT W. HUNT & CO.

Inspection—Tests—Consultation

Inspection New and Second Hand Machinery, Pumps, Crushers, Steam Shovels, Cars, Locomotives, Rails and Quarry and Contractors' Equipment

INSPECTION AND TESTS OF SAND, GRAVEL, CEMENT, STRUCTURAL STEEL, CASTINGS AND CONSTRUCTION MATERIALS

Cement, Chemical and Physical Testing Laboratories

CHICAGO
2200 Insurance Exchange
New York St. Louis Kansas City Cincinnati Pittsburgh San Francisco

Free Service to Readers of

Rock Products

If you are in the market for any kind of machinery, equipment or supplies, or if you desire catalogs, information or prices on any product, we are at your service—to obtain for you, without expense, catalogs, prices or specific information on every kind of machinery, equipment and supplies—or to help you find the hard to find source of supply.

RESEARCH SERVICE DEPARTMENT

ROCK PRODUCTS, 542 So. Dearborn St., Chicago, Illinois

Please send me catalogs and prices concerning the following items:

.....

.....

Name.....

Address.....

City..... State.....

TERRY

FAMOUS
DERRICK IRONS, FITTINGS
AND ERECTORS' TOOLS



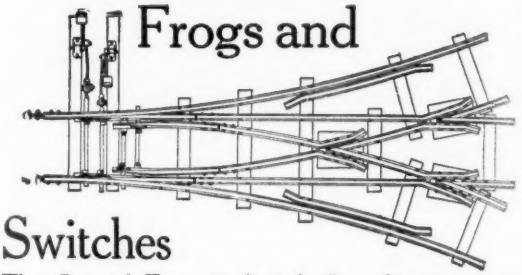
FULL CIRCLE CRANES. "EQUIPMENT THAT LASTS." TIMBER & STEEL DERRICKS

LET US SOLVE YOUR MATERIAL HANDLING PROBLEMS.

All Types of
Steel and Timber
DERRICKS

TERRY

Frogs and



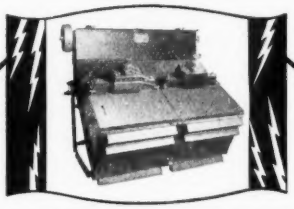
Switches

The Central Frog & Switch Co., Cincinnati, O.

Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fish Plates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.

PERFORATED
SCREENS
and Steel Plate Work

W. TOEPFER & SONS COMPANY
Milwaukee Wisconsin



HUM-MER *Electric* SCREEN

Makes screening and crushing more profitable. Screens any material, wet or dry, from 2½" opening to minus 200 mesh.

Send for Catalog No. 45-R

THE W. S. TYLER COMPANY
CLEVELAND, OHIO
Manufacturers of Woven Wire Screens and Screening Equipment

SAUERMAN DRAGLINE CABLEWAY EXCAVATORS
dig, convey, elevate and dump in one operation

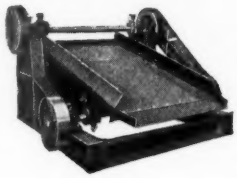
Cost data furnished by prominent gravel producers who are using Sauerman equipment backs up our claim that sand and gravel can be excavated and conveyed from pit to plant by one of our drag-line cableway excavators at a lower cost per ton than by using any other equipment or combination of equipment.

Write for Catalog No. 7

Sauerman Bros.
1140 Monadnock Bldg.
Chicago
Also Mfrs. of Power Scrapers



A ROBINS PERFEX SCREEN



will screen your SAND and GRAVEL, better and cheaper than any other screen. IT IS ABSOLUTELY FREE FROM VIBRATION, and takes but little power.

Write for Bulletin No. 58-R

ROBINS CONVEYING BELT CO.
New York Chicago Pittsburgh Boston

OHIO
LOCOMOTIVE
CRANES
OHIO LOCOMOTIVE CRANE CO.
BUCYRUS, OHIO



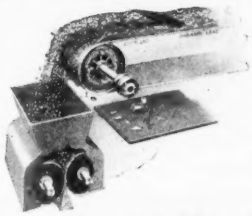
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Rock Products

The Nation's Business Magazine of the Rock Products Industry

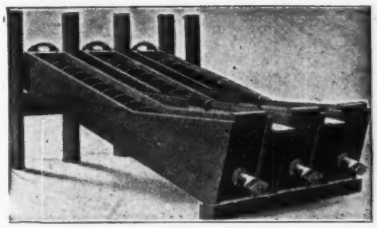
542 So. Dearborn St. Chicago, Illinois

"HIGH DUTY" MAGNETIC PULLEYS



This Magnetic Pulley positively protects crushers, pulverizers and grinders against breakage from tramp-iron. Its installation insures continuous operation of your plant.

Magnetic Manufacturing Company
273 23d Avenue Milwaukee, Wis.



Sand Washers



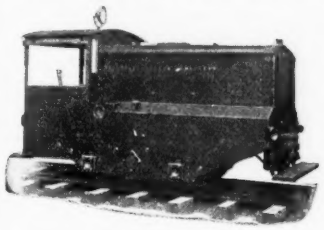
9-Foot Dry Pan

Lewistown Foundry & Machine Co.
LEWISTOWN, PA.

Builders of heavy duty crushers and glass sand machinery. Glass sand plants equipped complete.

Write for prices and catalog

Minster Industrial Locomotives

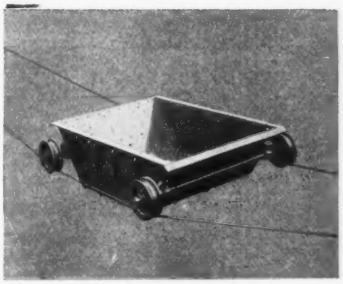


Assure maximum service with a minimum cost for upkeep. 2 to 8 ton capacities.

Write for Catalog

The Industrial Equipment Co.
310-316 Ohio Street
MINSTER, OHIO

Eastern and Export Department
THE HERBERT CRAPSTER CO., INC.
1 Madison Avenue New York City



Automatic Aerial Tramway

The Costs of
Installation Maintenance and Operation
Justify its use at mine or quarry

INTERSTATE EQUIPMENT CORP.
25 Church Street New York City

THE STANDARD OF EXCELLENCE

BALDWIN
Industrial and Contractors' LOCOMOTIVES

are in use where dependable motive power is required.

Full information upon request

The Baldwin Locomotive Works
PHILADELPHIA

FLORY HOISTS
CABLEWAYS
DREDGING MACHINERY

A Flory Hoist for Every Purpose

CATALOG ON REQUEST

S. FLORY MFG. CO.
BANGOR, PENNSYLVANIA

New York, 95 Liberty St.; Pittsburgh, House Bldg.; Birmingham, Chas. T. Lehman; Chicago, Monadnock Block; Hartford, K. B. Noble Co.; Huntington, W. Va., Banks Supply Co.

CARS

WE MAKE CARS FOR COAL, ORE, STONE, SAND, GRAVEL, CLAY AND BRICK. DRYER AND INDUSTRIAL CARS. THE WATT FACTORY IS THE LARGEST IN THE WORLD DEVOTED ALONE TO CAR BUILDING OVER 50 YEARS' EXPERIENCE

CATALOGS

The Watt Mining Car Wheel Co.
BARNESVILLE, OHIO

World famous for shafting and machinery lubrication!

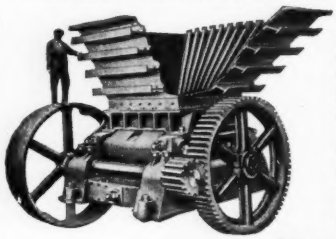
Albany Grease

"All Men Know It
Knowing Men Use It"
At Your Dealers!

A MARK known and respected around the world — Since 1868 — for fair dealing, a quality product and an unexcelled service

Adam Cook's Sons
708-710 Washington St., New York

"PENNSYLVANIA" Single Roll Crusher



The New Series of "Pennsylvania" Single Roll Crushers take steam-shovel feed of limestone, cement rock, gypsum and similar materials, — wet and sticky, — without feeder, and make maximum reduction in one operation. All parts readily accessible. Maintenance cost lower per ton than for any other type. Massive construction — Reliable Safety Devices — Convenient adjustment. Capacities 5 to 450 tons hourly.

Put Your Reduction Problems Up to Us

PENNSYLVANIA CRUSHER COMPANY

Stephen Girard Bldg., Philadelphia

New York
Pittsburgh

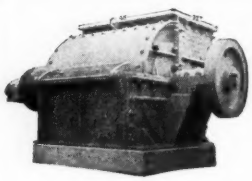
BYERS Model "10" Full Circle Crane



OPERATOR can raise or lower the boom *under absolute control* while lifting or dropping bucket, rotating, or traveling. Exclusive Byers feature; many other points just as important—study them *all* in interesting Bulletin, just out.

• • •

The Byers Machine Co.
310 Sycamore St., Ravenna, O.
Agents in Leading Cities



Gruendler Hercules Crushers

Gruendler Hercules Crushers are reducing production costs in hundreds of plants throughout the country.

"America's Famous Crushers"

For Crushing and Pulverizing Limestone, Lime, Gypsum, Shale, etc., a Gruendler cannot be beat.

Write for Interesting Bulletin

Gruendler Patent Crusher & Pulverizer Company
908 North Main Street St. Louis, Mo.

NORTHWEST *CRAWLER* CRANE *and* SHOVEL

Northwest Crane has perfected crawler mechanism and truck-like steering device; goes anywhere. Best for quarries and sand and gravel pits; goes quickly from job to job; travels over rocks and uneven ground; will climb pile and double-deck material. Can be used with clamshell or dragline bucket, lifting magnet or grappling hooks.

The Northwest Shovel combines greater power with Northwest mobility. No auxiliary motors to operate dipper stick — full power available for crowding as well as hoisting; maintenance costs are cut. More power at dipper lip; greater capacity; greater back reach; will dig 30′ flat width 4′ below grade. Only one motor used—either gas or electric.

NORTHWEST ENGINEERING COMPANY
Works: GREEN BAY, WIS.
General Sales Office: 28 E. Jackson Blvd., Chicago, Ill.
Eastern District Sales Office: Room 303, Singer Bldg., New York, N. Y.

BACON-FARREL ORE & ROCK CRUSHING-WORLD KNOWN ROLLS-CRUSHERS

EARLE C. BACON, INC. ENGINEERS
26 CORTLANDT ST., NEW YORK

THE McMYLER

THERE is power built into each machine, a ruggedness that can be depended on to stretch out into months and years of flawless service.

Try out the Type "J" Locomotive Crane and its operation will convince

THE McMYLER INTERSTATE CO.
Cleveland, Ohio

BRANCH OFFICES:

New York City, 1756 Hudson Terminal Building
Chicago, Ill., 812 Edison Bldg.
Seattle, Wash., Hoge Building
Denver, Colo., 18th and Wazee Streets
San Francisco, Calif., 766 Folsom Street
New Orleans, La., 444 Maison Blanche Annex
Birmingham, Ala., Brown-Marx Building
Boston, Mass., 261 Franklin St.

Take the "Hand" Out of Handling

Use an O. S. Dependable Crane



and increase your profits by reducing your costs.

Catalogues 18 and 21 should be in your files.

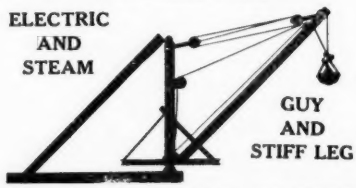
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Orton & Steinbrenner Co.
Main Offices
608 So. Dearborn St.
Chicago, Ill.
Shops—Huntington, Indiana

HOISTS

TRADE MARK
MUNDY
ESTABLISHED 1869

ELECTRIC AND STEAM



GUY AND STIFF LEG

DERRICKS

"RUGGED, DURABLE EQUIPMENT"

J. S. MUNDY HOISTING ENGINE CO.
NEWARK, N. J., U. S. A.

OSGOOD



BEST BY TEST

"ASK THE USER"

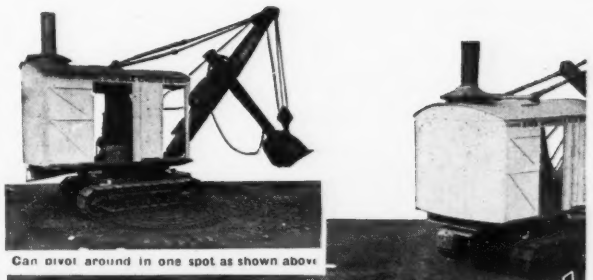
OSGOOD ¾ and 1 cu. yd. Revolving Shovels are noted for their ability to produce more yards at less cost due to their rigid and sturdy construction, simplicity of operation and long life.

Every piece of the Traction or Continuous Mountings is of open-hearth, annealed cast steel. Quick Acting Power Steering Devices, Horizontal Hoisting Engines, Vertical Submerged Tube Type Boilers and the fact that Crane, Clamshell or Dragline features can be added now or later are IMPORTANT TO YOU.

Write for General Catalog 122-M.

THE OSGOOD COMPANY

Marion, Ohio, U. S. A.



Can pivot around in one spot as shown above

Perfect Power Steering from the Cab

The Caterpillar type ERIE steers perfectly, by power, from the cab—making either sharp or gradual turns as desired. No man is needed to walk alongside and throw clutches to steer.

The elimination of this clutch-throwing job cuts one needless man off the payroll. This is just one of the many ways in which the caterpillar type ERIE saves you money.

For working over soft ground, a caterpillar type ERIE means the saving of thousands of dollars to you. We would like to tell you about its many advantages in detail—and send photos. Write for bulletin P-60.

And in many other ways the caterpillar type ERIE is far superior

FULLY LUBRICATED: Tread links and rollers are automatically lubricated by internal reservoirs.

ALL STEEL TREADS that are almost indestructible.

CLIMBS GRADES as steep as 30%, and travels several times as fast as is possible without lubrication.

EASILY INTERCHANGEABLE with traction wheel mounting on the same truck frame.

IN EVERY WAY, fully up to the standard of the ERIE Shovel.

ERIE Revolving Shovels

ERIE STEAM SHOVEL CO.

Formerly BALL ENGINE CO., Erie, Pa., U.S.A.

Builders of ERIE Steam Shovels and Locomotive Cranes

EVER-GREEN and EVER-RED Slate Granules

Ever-Green and Ever-Red Slate Granules, used in making slate surfaced roofing, slate flour as a filler in paints, mechanical rubber goods, linoleum, window shades, plastic roofing, roofing cement, and asphalt roads, can be used with telling effect

For the Facing of Concrete Blocks, Bricks or Stucco

The beauty, style and finish of a building covered with this material adds appreciably to its value.

It can be delivered carefully graded to size.

Write for samples and prices

VERMONT MILLING PRODUCTS CORP.

POULTNEY, VERMONT

METRO NITE

for Stucco

Metro-Nite White is a siliceous dolomite, extremely hard, sharp, cleanly graded and makes a bright, sparkling face for stucco buildings, concrete bricks or blocks.

It is generally accepted as the most beautiful and artistic facing known for this purpose, and we will gladly send samples to anyone who is interested in carload lots.

Metro-Nite can be delivered either in white or green.

THE METRO-NITE CO.

333 Hartford Ave., Milwaukee, Wis.

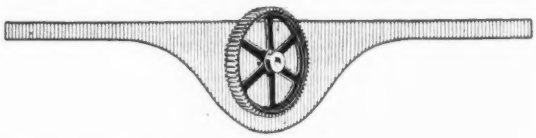
GEARS

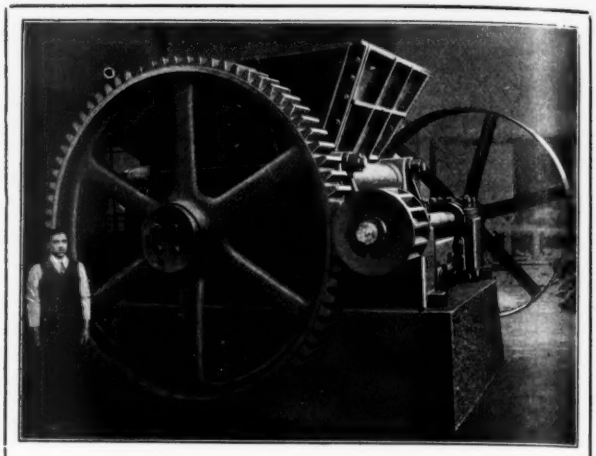
SMOOTH running; correct in design, accurate and true to pitch, Caldwell gears are bound to please you. We make all types—machine-molded, cut tooth, mortise gears, worm gears, etc. Learn more about Caldwell-Link-Belt Service.

Let us figure with you next time you are in the market.

H. W. CALDWELL & SON CO. LINK-BELT COMPANY, OWNER
Dallas, Texas, 709 Main Street—Chicago, 17th Street and Western Ave.—New York, Woolworth Bldg.

CALDWELL



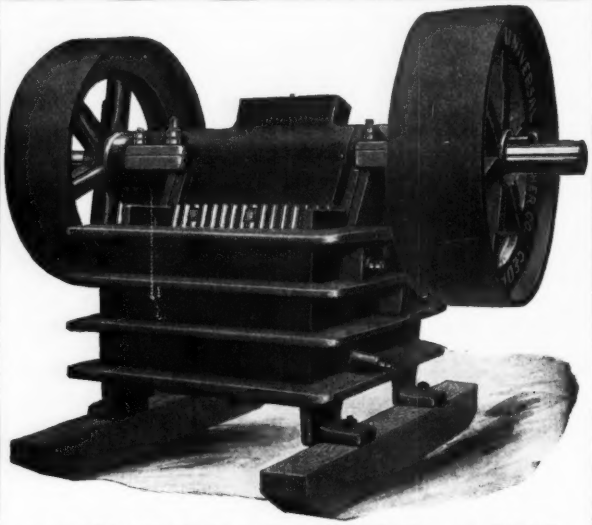


If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

McLanahan-Stone Machine Co.
Hollidaysburg, Pa.
Screens, Elevators, Conveyors, Rock Washers, Etc.



UNIVERSAL STEEL LINE

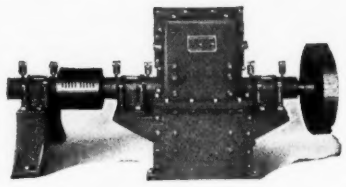
THE PERFECT GRAVEL AND REJECTION CRUSHER

Sizes up to 8"x36". Capacities 20 to 200 tons daily. Crushes to ¾" and finer if desired. Has no superior for FINE CRUSHING and UNIFORMITY of product.

STRONG LIGHT DURABLE ECONOMICAL

UNIVERSAL CRUSHER CO.
225 Third Street Cedar Rapids, Iowa, U. S. A.

"K-B" ALL-STEEL PULVERIZER



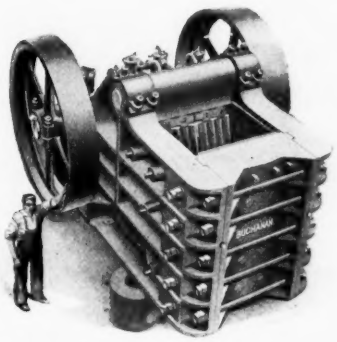
High Production
Low Power Cost

The efficiency of any machine lies in its ability to do a large amount of work with a small consumption of power.

The "K-B" does this!

Ask us for full information

K-B PULVERIZER **K-B Pulverizer Company, Inc.**
92 Lafayette Street, New York



Buchanan All-Steel Crushers

TYPE "C" JAW CRUSHER

Illustration shows Buchanan "All-Steel" Jaw Crusher, with frame of reinforced construction, intended for heavy and continuous duty encountered in large operations.

Jaw plates are made sectional. Upper and lower plates are interchangeable, increasing wear obtainable.

Steel-castings are carefully annealed and all shrinkage strains are entirely removed. Bearings have double system of lubrication, are water jacketed, and in the larger sizes are removable.

Built in sizes from 24 in. x 36 in. to 66 in. x 84 in.

Write for Bulletin No. 10

C. G. BUCHANAN COMPANY, Inc.

Cedar and West Streets, New York City

Southwestern Representative: David B. Dunn, Inc., 1226 E. 8th St., Los Angeles, Calif.

American Ring Pulverizer and Crusher



It Represents the Latest Development in Crushers and Pulverizers

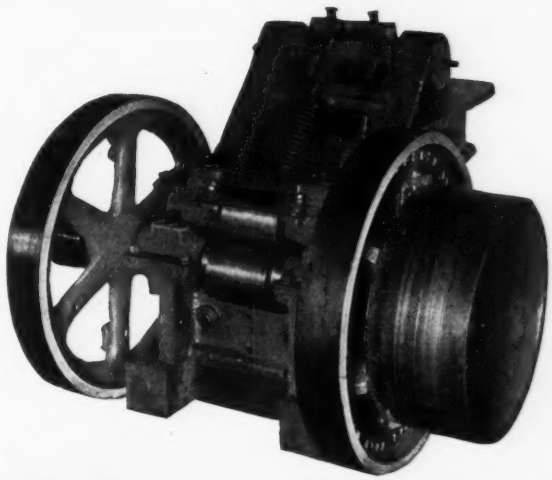
It is a superior machine capable of reducing Limestone to the desired fineness for agricultural purposes with the low cost of upkeep and power.

The flexibility of the Ring is the important feature.

Write us for particulars

AMERICAN PULVERIZER COMPANY

General Office and Factory: 18th and Austin Sts., St. Louis, Mo.



Reliance Crushers

IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

Let us quote you prices

Universal Road Machinery Co., Kingston, N. Y.

Branches in all principal cities in U. S. and Canada

MANUFACTURERS OF THE FAMOUS RELIANCE LINE OF ROAD BUILDING AND QUARRY EQUIPMENT

STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY

Crushing, Grinding, Pulverizing,
Screening, Sizing, Air Separating, Mixing,
Weighing, Elevating and Conveying Machinery
Complete Units -:- -:- Engineering Service

STURTEVANT MILL CO., HARRISON SQUARE BOSTON, MASS.

GAYCO-EMERICK
CENTRIFUGAL
AIR SEPARATORS



A Dependable "AIR-SCREEN" for sizing Fibrous, Flaky or Granular Materials. The Only Air-Separator for fine ABRASIVE PRODUCTS

60 mesh to 350 mesh

RUBERT M. GAY COMPANY
114 Liberty St., New York, N. Y.

SCHAFFER Poidometers

These machines weigh and regulate the flow of material traveling in a continuous stream over a conveyor.

They are especially adapted for—

Uniting different materials in the correct proportions.

Feeding material to mixing machinery.

Delivering predetermined quantity of materials to pulverizing or grinding machinery.

Feeding crushed coal to boilers.

Feeding powdered coal in the correct number of pounds per minute.

Loading materials into cars or vessels, and giving a record of the quantity loaded.

Assembling materials in batches, with correct amount of each material.

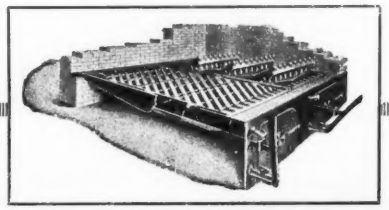
SCHAFFER ENGINEERING & EQUIPMENT CO.
2828 Smallman Street
Pittsburgh, Pa.

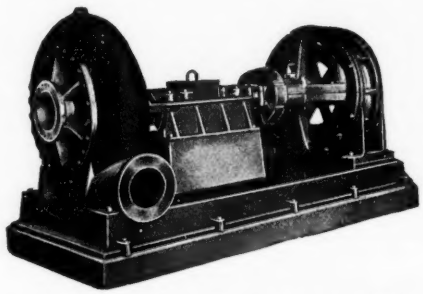
McGINTY GRATES

There are fourteen kilns at the Clay Center, Ohio, plant operated by the Kelly Island Lime and Transport Company, and every kiln is equipped with a set of McGinty Grates—the grate that was designed to withstand a higher degree of heat without warping than any other grate, **and does it.**

The McGinty Grate is a shaking, sifting and dumping grate, and the fires can be cleaned with closed doors.

The Kramer Bros. Fdy. Co.
Dayton, Ohio





Heavy Service Dredging Pump

Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4" up, arranged for belt, motor, or engine drive.

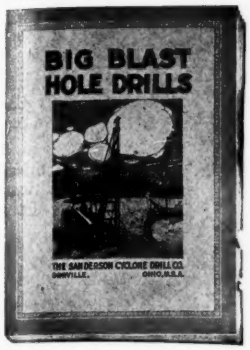
MORRIS MACHINE WORKS
50 Genesee St. Baldwinsville, N. Y.

39 Cortlandt St., New York City
Real Estate Trust Bldg., Philadelphia, Pa.
217 N. Jefferson St., Chicago, Ill.
Penobscot Bldg., Detroit, Mich.

Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

MORRIS

Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines



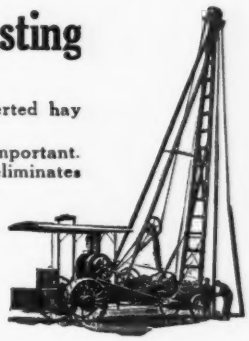
Analyze Your Drilling and Blasting

Our new Blast Hole Catalog B-46 (96 pages) will help you.

The day of poking a hole down with a rivet header or a converted hay bailer is past.

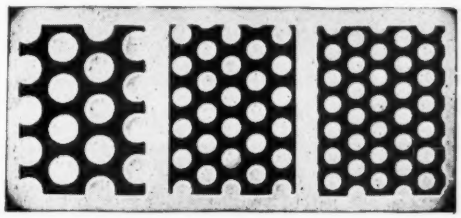
Drilling, being the first step in stone production, is the most important. One cent or one-half cent per ton cost saved in this operation often eliminates competition.

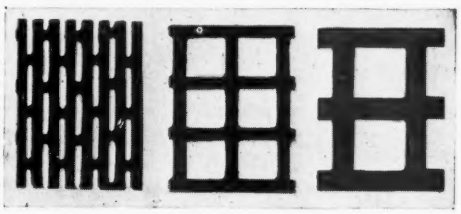
With Cyclone No. 14 Drills on the job and Cyclone Service in reserve, your drilling and blasting troubles fade—and your costs will be right.



THE SANDERSON-CYCLONE DRILL CO.
Orrville, Ohio
Eastern and Export Office, 30 Church St., New York

Perforated Steel Screens





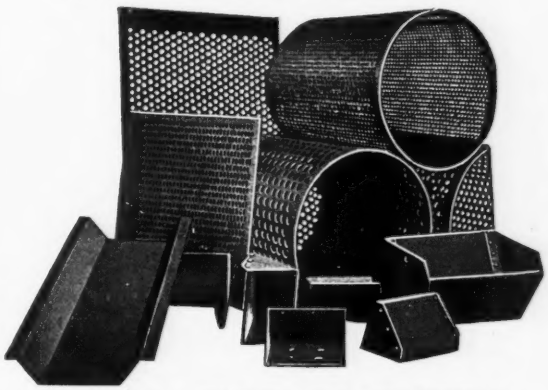
For Screening Stone, Gravel, Sand and Cement

All sizes and shapes of holes in metal of proper thicknesses to give the best screening results.

Sheets furnished flat or rolled to shape for revolving screens.

THE HARRINGTON & KING PERFORATING CO.
621 N. Union Ave., Chicago, Ill.
NEW YORK OFFICE: 114 Liberty St.

Perforated Metal Screens
FOR
Stone, Gravel, Sand, Etc.



ELEVATOR BUCKETS
PLAIN AND PERFORATED
General Sheet and Light Structural Work
"Light and Heavy Steel Plate Construction"
HENDRICK MFG. CO.
CARBONDALE, PA.
New York Office, 30 Church Street
Pittsburgh Office, 544 Union Arcade Bldg.
Hazleton, Pennsylvania, Office, 705 Markle Bank Bldg.

CROSS ENGINEERING CO. CARBONDALE, PA. PERFORATED SHEET METALS CE

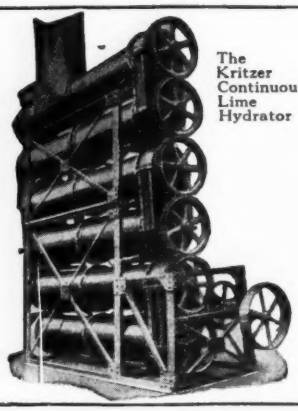
Perforated Steel Screens

The success of any house supplying repair and renewal parts depends on furnishing what is needed quickly and correctly, and of satisfactory quality.

Sixteen years in the Perforated Metal field have given us the experience, equipment and technical knowledge and three hundred tons or more of Steel Plates and Sheets enable us to fill rush orders promptly.

Try us with your next order.

Cross Engineering Company, Offices and Works, Carbondale, Pa.



The Kritzer Continuous Lime Hydrator

HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

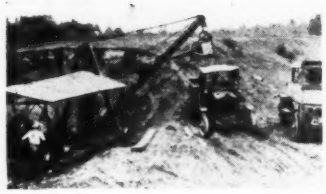
A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

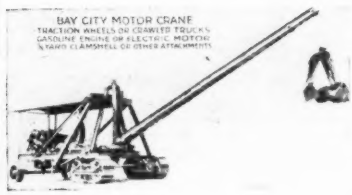
THE KRITZER COMPANY

503 South Jefferson Street CHICAGO, ILL.

The One Man Excavator







A light, low-priced excavator and loader for sand and gravel pits.

Operates Dipper or Clamshell

Caterpillar or track mounting. Gasoline or electric motor. One man operated handles 25 to 40 yards per hour. Average operating cost per day $8.00 including operator. Displaces ten or a dozen men. Soon pays for itself.

A Caterpillar Mounted Power Shovel for Less Than $3,000

Load your trucks, wagons, or screens with the Bay City. You don't need a high priced shovel for this work. The Bay City costs less to purchase and operate and it will do your work.

Builders of the Bay City Crane

BAY CITY DREDGE WORKS

2800 Center Ave.
BAY CITY, MICH.

The Clyde Lime Hydrator Performance Counts

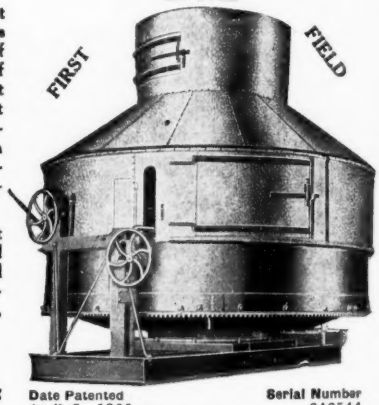
The Clyde was first in the field, and through dependable and economical performance is still first choice of lime operators.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

Simple, easiest to operate and most economical in cost of installing, maintaining, and operating.

IN THE FIRST FIELD



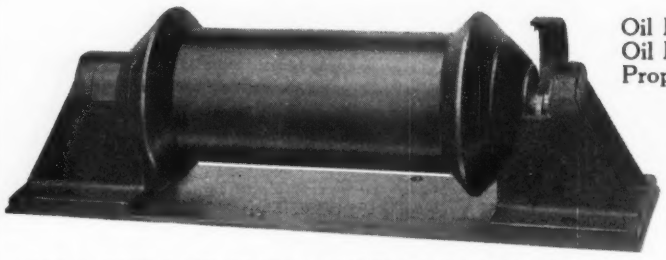
Send for Catalog

Date Patented	Serial Number
April 3, 1900	646544
October 10, 1905	801329
November 29, 1921	1398238

H. MISCAMPBELL

Patentee and Sole Manufacturer

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Oil Reservoirs
Oil Rings Insure
Proper Lubrication



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ATLAS EXPLOSIVES
USED ON BIG JOBS EVERYWHERE



Thawing kettles and the thawing house, once indispensable factors in the use of high explosives, now are things of the past on operations where Atlas Non-Freezing is used. Furthermore, the "powder headache," so common with the handling of ordinary high explosives, is UNKNOWN where this super-explosive is employed. Tell us what explosive you now are using and we will tell you what grade of Atlas Non-Freezing will do YOUR work.

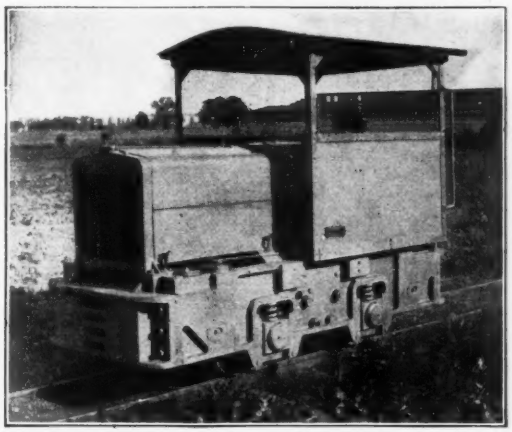
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QUARRIES—CEMENT PLANTS—BRICK PLANTS

The success of Whitcomb locomotives in hundreds of plants speaks of their thoroughness of design and construction and dependability in time of need. We would be glad to tell you what they are doing for others.

Whitcomb locomotives are designed to work and built to overwork

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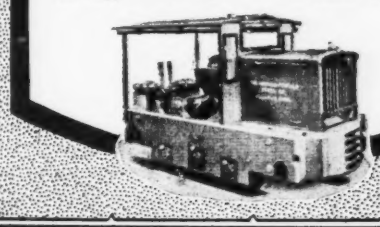
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A Daily Saving of $68.16

That's the story—and those dollars saved amount to a nice sum in a short time.

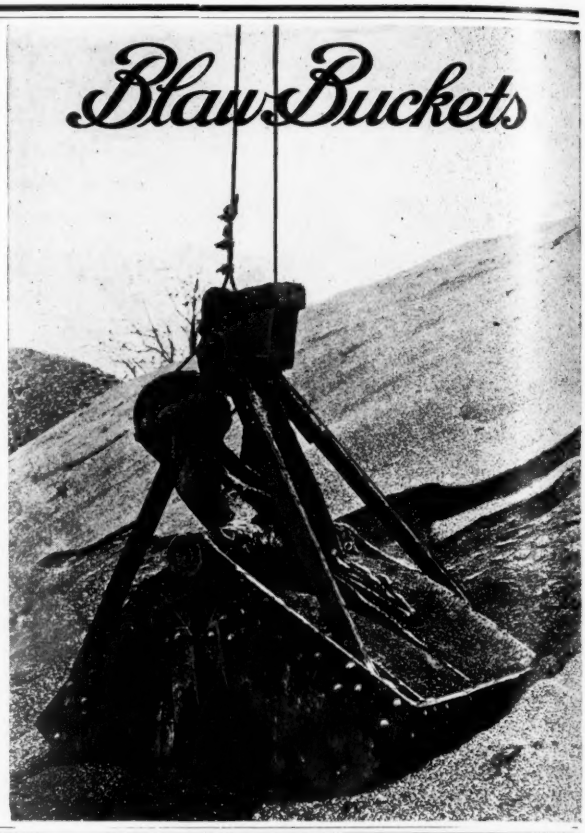
It's the story of a Blaw-Knox SPEEDSTER Bucket installed on a P. & H. Crane at the plant of the Combined Locks Paper Co., Combined Locks, Wis.

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Equip yourself with Blaw-Knox Buckets—you can also mantain an average saving per day.

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Engineers, Founders, and Machinists
Established 1859 — Incorporated 1877
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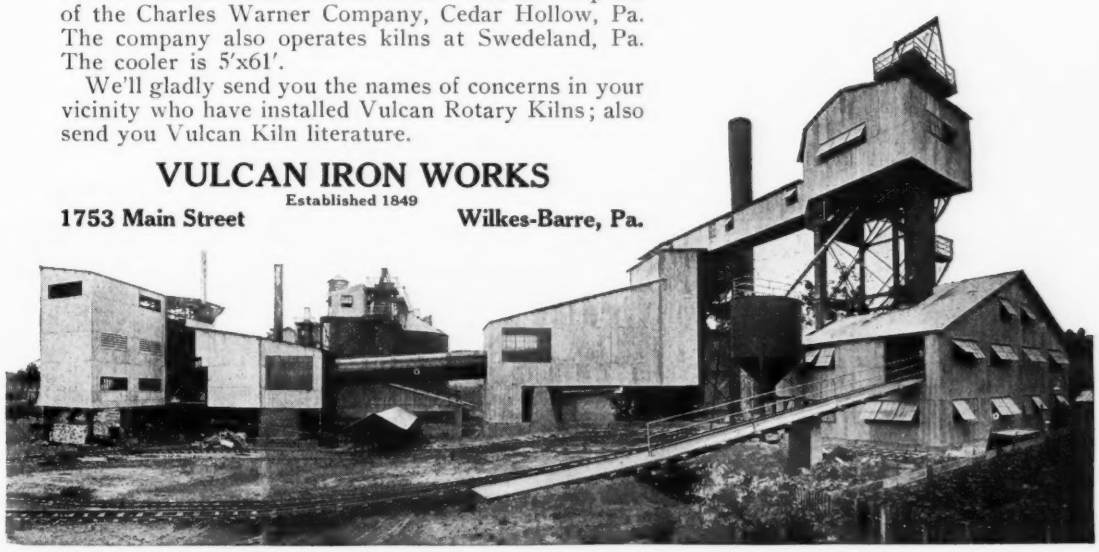
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You will probably find it to your advantage to call on one of the concerns that have installed Vulcan Rotary Kilns. In these 960 Vulcan installations, all processes are represented.

The illustration shows one 8′x150′ kiln in the plant of the Charles Warner Company, Cedar Hollow, Pa. The company also operates kilns at Swedeland, Pa. The cooler is 5′x61′.

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Established 1849
1753 Main Street **Wilkes-Barre, Pa.**



DMC
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Send it Safely—Ship in Steel



No. 12 Light Shipping Steel Barrel

Serving the Lime Field

For one year we have been offering the lime and cement field the services of the Draper Steel Barrel. Results have so far justified our efforts that we feel impelled to say to every producer that the advent of our steel barrel in this field has marked an epoch in the shipping of rock products.

If you are not using Draper Steel Barrel Service
get in touch with our sales department

"What the Shipper Puts In
the Customer Takes Out"

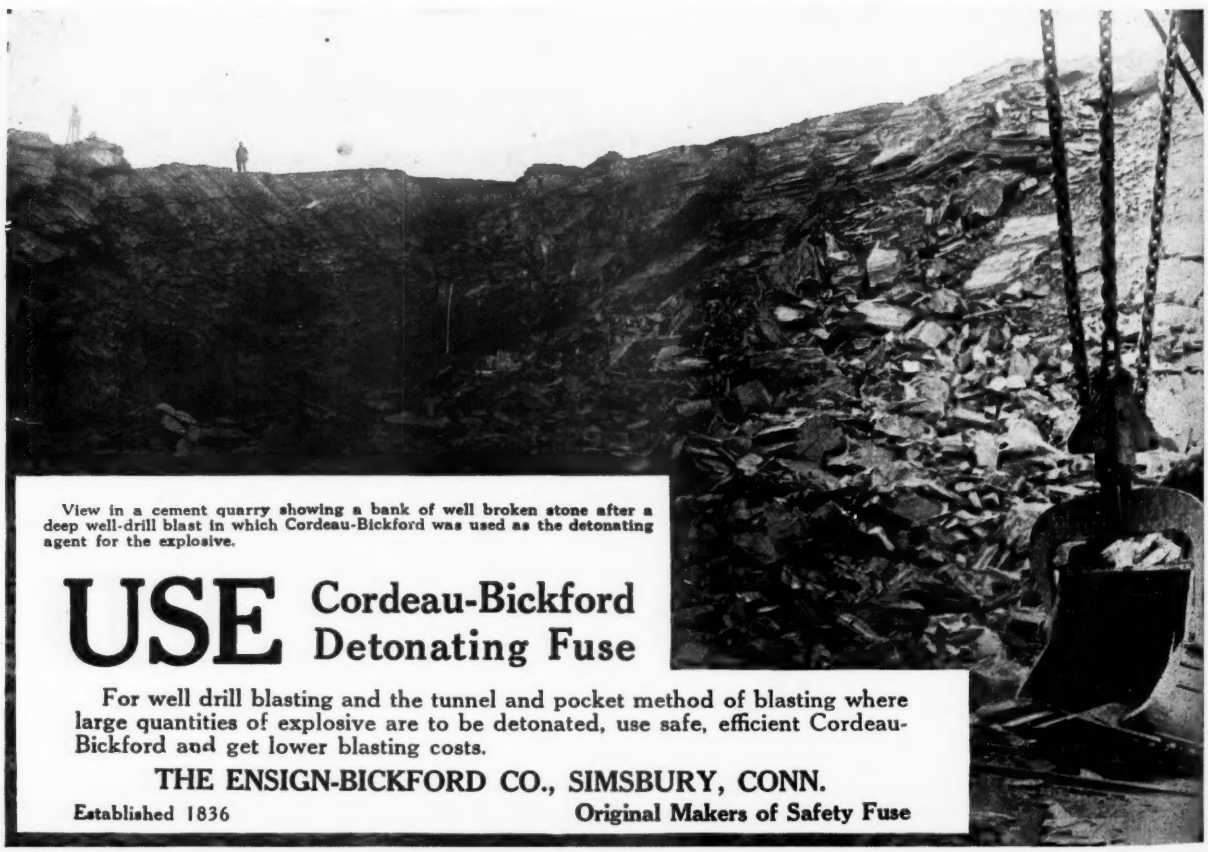
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Our No. 9 Catalogue
Just Fits Your Pocket



View in a cement quarry showing a bank of well broken stone after a deep well-drill blast in which Cordeau-Bickford was used as the detonating agent for the explosive.

USE Cordeau-Bickford Detonating Fuse

For well drill blasting and the tunnel and pocket method of blasting where large quantities of explosive are to be detonated, use safe, efficient Cordeau-Bickford and get lower blasting costs.

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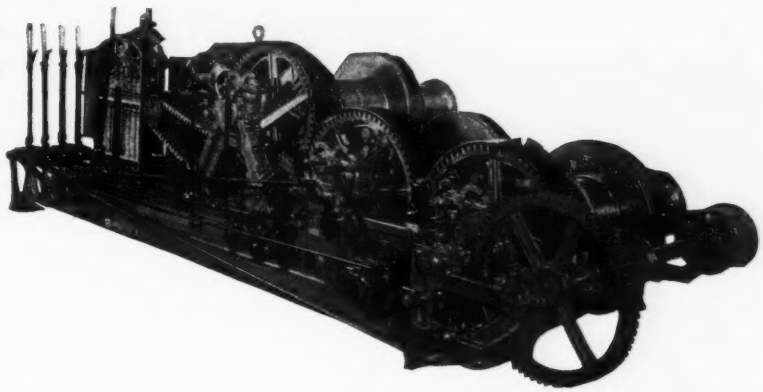
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Designed and built for every requirement of the Sand, Gravel and Stone Producer.

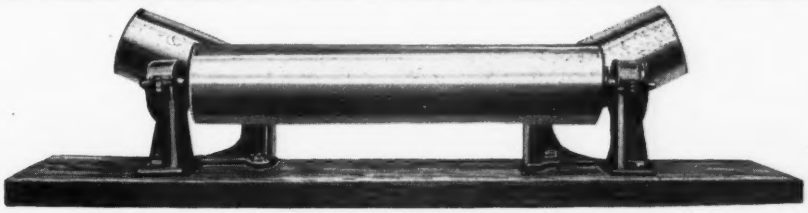
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Dragline Cableways
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The Greenville Mfg. Co. is the maintenance and manufacturing department of the Greenville Gravel Co., who operate a dozen large sand and gravel washing plants and have been in the game for twenty years. Our belt conveyor carriers and return rollers were designed and are built for our own plants because we could find nothing on the market which would withstand the severe service required in handling gravel. They are of the ball-bearing, dust-proof, self-aligning type, made up of heavy pipe mounted on hubs, cast integral with cold rolled gudgeons; the whole machined after assembly to insure perfect concentricity. They have been thoroughly tried and have exceeded our expectations in our own plants, because they cost less, last much longer, and require almost no up-keep. Write for our catalogue on sand and gravel plant equipment.



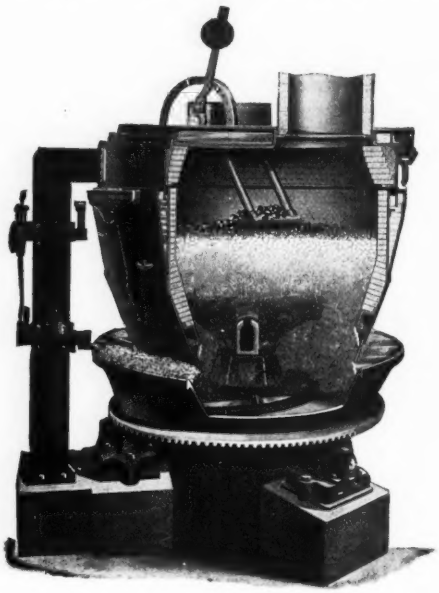
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"Specialists in Sand and Gravel Plant Equipment"
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Selected by every large purchaser in the steel industry since the armistice. Three recent installations at leading Eastern Lime Plants.

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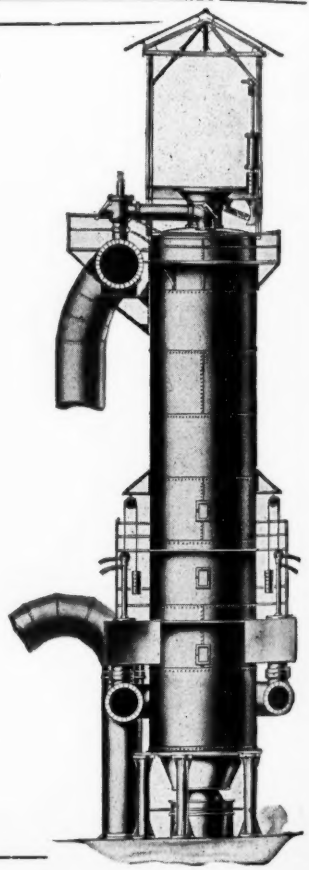
Users everywhere testify with one voice to the superior satisfaction and low maintenance expense of this splendid machine. Difference in first cost comes back annually; every detail built for endurance.

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Pittsburgh Office 704 Arrott Bldg. Telephone Court 1381

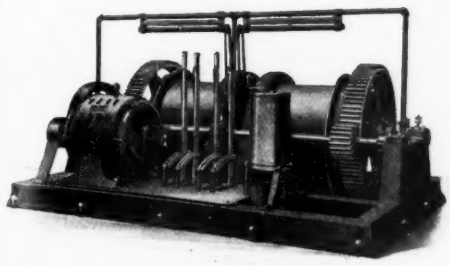
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The wastefulness of efficiency of any lime burning apparatus is determined by the amount of fuel per ton of lime produced.

Our Kilns are not an experiment, but have successfully met the test of years of actual service. The design is the work of our Consulting Mechanical and Chemical Engineer, who has had many years of practical operative experience. They embody a number of labor saving devices, and are designed to secure maximum production with minimum fuel consumption; their record in this respect should interest every lime producer in the country.



Glamorgan Pipe & Foundry Company
Lynchburg, Va., U. S. A.
Using the Nationally Famous Virginia Foundry Irons



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The true economy of an OTTUMWA Hoist comes from its ability to give the utmost for the very least in repairs and overhauling.

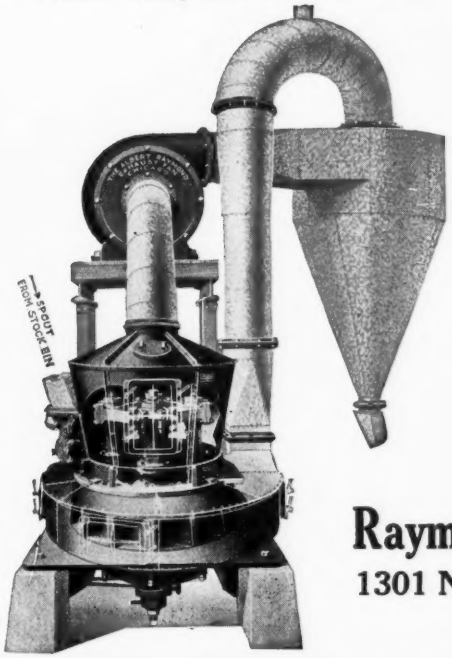
Entirely aside from our conviction that these hoists are unusual in value, we consider the real service this organization gives to the non-metallic mineral industry is the corps of competent and experienced engineers we maintain to aid our customers in properly applying machinery for the best results.

It will pay you to consult with them, and if their suggestions do not happen to meet with your approval, you are under no obligations.

OTTUMWA Patent Roller Bearing Wheel Trucks for quarry or pit cars give a long time service, and accomplish a real saving in oil and power.

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Two More Cement Plants Have Found From Experience That Raymond Roller Mills Grind Their Coal Economically



One has replaced tube mills with Raymond Roller Mills reducing, very materially, their power and repairs and producing a more uniform coal which has enabled them to better the control of their kilns and increase their production.

The other has replaced another type of pulverizer with the efficient Raymond Roller Mill, obtaining finer and more uniform coal which has enabled them to obtain the same production from 19 kilns, where formerly the operation of 20 was necessary.

Let us make you a proposition

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of the Rock Products Industry

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Schaffer Eng. & Equip. Co., Pitsburgh, Pa.

BAGS AND BAG MACHINERY
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Valve Bag Co. of America, Toledo, Ohio.

BARRELS—Lime
Draper Mfg. Co., The, Cleveland, Ohio.
Sandusky Cooperage & Lbr. Co., Toledo, Ohio.

BELTING
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New York Belting & Packing Co., New York, N. Y.

BINS
Blaw-Knox Co., Pittsburgh, Pa.
Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill. (storage)

BIN GATES
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bacon, Earle C., Inc., New York City.
Blaw-Knox Co., Pittsburgh, Pa.
Greenville Mfg. Co., Greenville, Ohio.
Link-Belt Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Weller Mfg. Co., Chicago, Ill.

BLASTING SUPPLIES
Atlas Powder Co., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.

BRICK MACHINERY
Besser Sales Co., Chicago, Ill.

BUCKETS—Elevator
Greenville Mfg. Co., Greenville, Ohio.
Hendrick Mfg. Co., Carbondale, Pa.
Link-Belt Co., Chicago, Ill.
Orton & Steinbrenner, Chicago, Ill.

BUCKETS
Blaw-Knox Co., Pittsburgh, Pa.
McMyler Interstate Co., Cleveland, Ohio.

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Blaw-Knox Co., Pittsburgh, Pa.
S. Flory Mfg. Co., Bangor, Pa.
Interstate Equip. Co., New York, N. Y.
Link-Belt Co., Chicago, Ill.

CALCINING MACHINERY
Ehrsam & Sons Co., J. B., Enterprise, Kans.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

CARS—Quarry and Industrial
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Ottumwa Iron Wks., Ottumwa, Iowa.
Watt Mining Car Wheel Co., Barnesville, Ohio.

CAR PULLERS
Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

CEMENT MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

COMPRESSORS, AIR
Ingersoll-Rand Co., New York City.

CONVEYORS AND ELEVATORS
Caldwell, H. W., & Son Co., Chicago, Ill.
Greenville Mfg. Co., Greenville, Ohio.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Robins Conveying Belt Co., New York City.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.

CRANES—Locomotive, Gantry
Byers Mach. Co., The, Ravenna, Ohio.
Erie Steam Shovel Co., Erie, Pa.
Link-Belt Co., Chicago, Ill.
McMyler-Interstate Co., Cleveland, Ohio.
Ohio Locomotive Crane Co., Bucyrus, Ohio.
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., The, Marion, Ohio.

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American Pulverizer Co., St. Louis, Mo.
Bacon, Earle C., Inc., New York, N. Y.
Buchanan Co, Inc., C. G., New York, N. Y.
K. B. Pulverizer Co., New York, N. Y.
Lewistown Fdry. & Mach. Co., Lewistown, Pa.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Smidth & Co., F. L., New York, N. Y.
Smith Eng Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa.
Universal Road Mach. Co., Kingston, N. Y.

CRUSHER REPAIRS—Manganese Steel
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Plamondon Mfg. Co., Chicago, Ill.
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Terry Mfg. Co., New York, N. Y.

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American Manganese Steel Co., Chicago Heights, Ill.

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DYNAMITE
Atlas Powder Co., Wilmington, Del.
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R. W. Hunt & Co., Chicago, Ill.
McGain Mfg. Co., York, Pa.
Smidth & Co., F. L., New York, N. Y.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

EXCAVATORS
Bay City Dredge Works, Bay City, Mich.
Blaw-Knox Co., Pittsburgh, Pa.
Erie Steam Shovel Co., Erie, Pa.
Northwest Eng. Co., Green Bay, Wis.

EXCAVATORS—Dragline Cableway
Link-Belt Co., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

EXPLOSIVES
Atlas Powder Co., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.

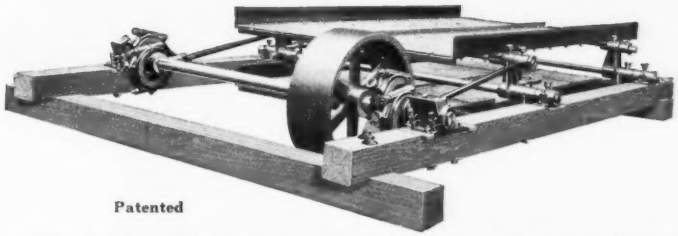
FUSES
Ensign-Bickford Co., Simsbury, Conn.

GAS PRODUCERS
McGain Mfg. Co., York, Pa.
Morgan Construction Co., Worcester, Mass.

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COMPENSATED TYPE SHAKING SCREEN



Patented

You will find the same ruggedness in "Allis-Chalmers" Screening equipment as found in all of their products, the result of a half century of experience. The durability, simplicity and efficiency of the "Allis-Chalmers" Compensated Type Shaking Screen is unequalled by any other screen on the market.

By balancing one screen against the other, much of the vibration in the frame and building is eliminated. Up-to-date commercial limestone and gravel plants realize the vital importance of installing shaking screens permitting the production of smaller stones to meet the market requirements.

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The Wooden Barrel is Superior



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SANDUSKY COOPERAGE & LUMBER CO., Toledo, Ohio

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GRATES
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HOISTS
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J. S. Mundy Hoisting Engine Co., Newark, N. J.
Link-Belt Co., Chicago, Ill.
Ottumwa Iron Works, Ottumwa, Iowa.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

HOSE—Water, Steam, Air Drill, Pneumatic Tool
Ingersoll-Rand Co., New York City.
N. Y. Belting & Packing Co., New York, N. Y.

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Miscampbell, H., Duluth, Minn.
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McGain Mfg. Co., York, Pa.
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Erie Steam Shovel Co., Erie, Pa.
Jeffrey Mfg. Co., Columbus, Ohio.
Link-Belt Co., Chicago, Ill.
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Fate-Root-Heath Co., Plymouth, Ohio.
Hadfield-Penfield Steel Co., Bucyrus, Ohio.
Industrial Equip. Co., Minster, Ohio.
Lima Locomotive Works, New York, N. Y.
Vulcan Iron Works, Wilkes-Barre, Pa.
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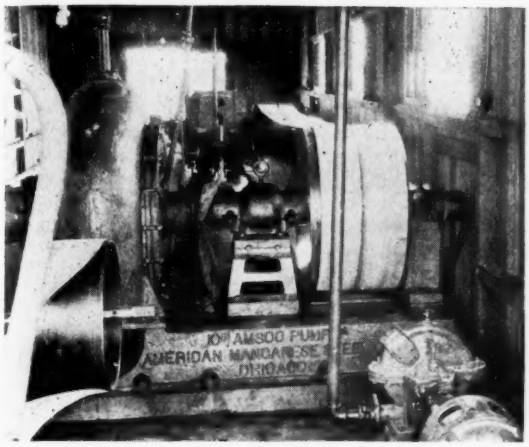
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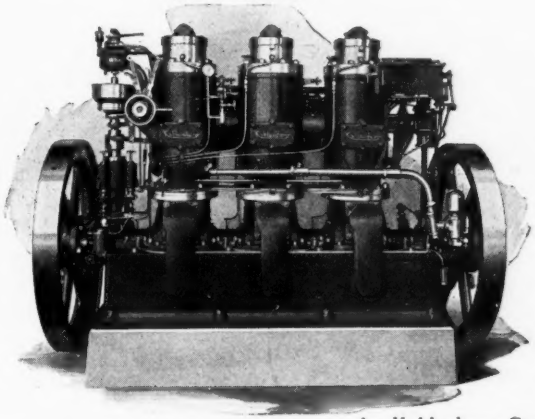
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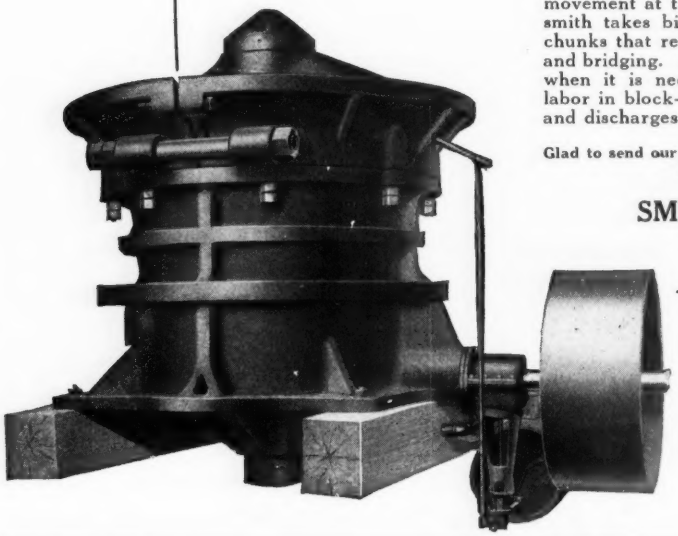
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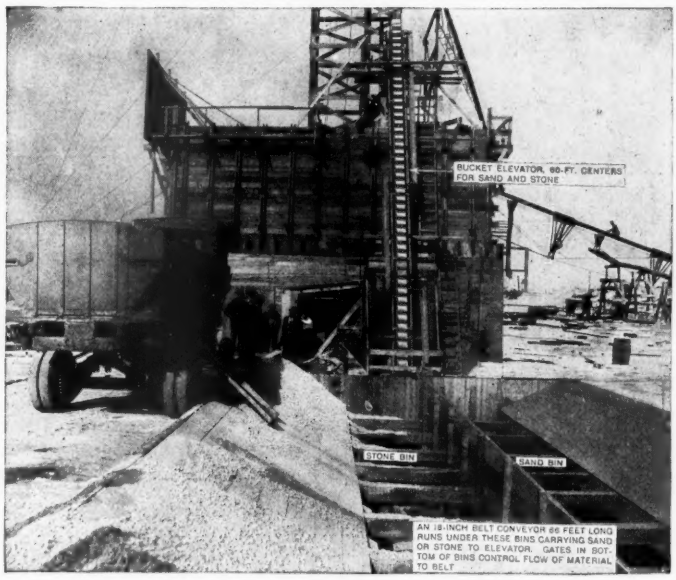
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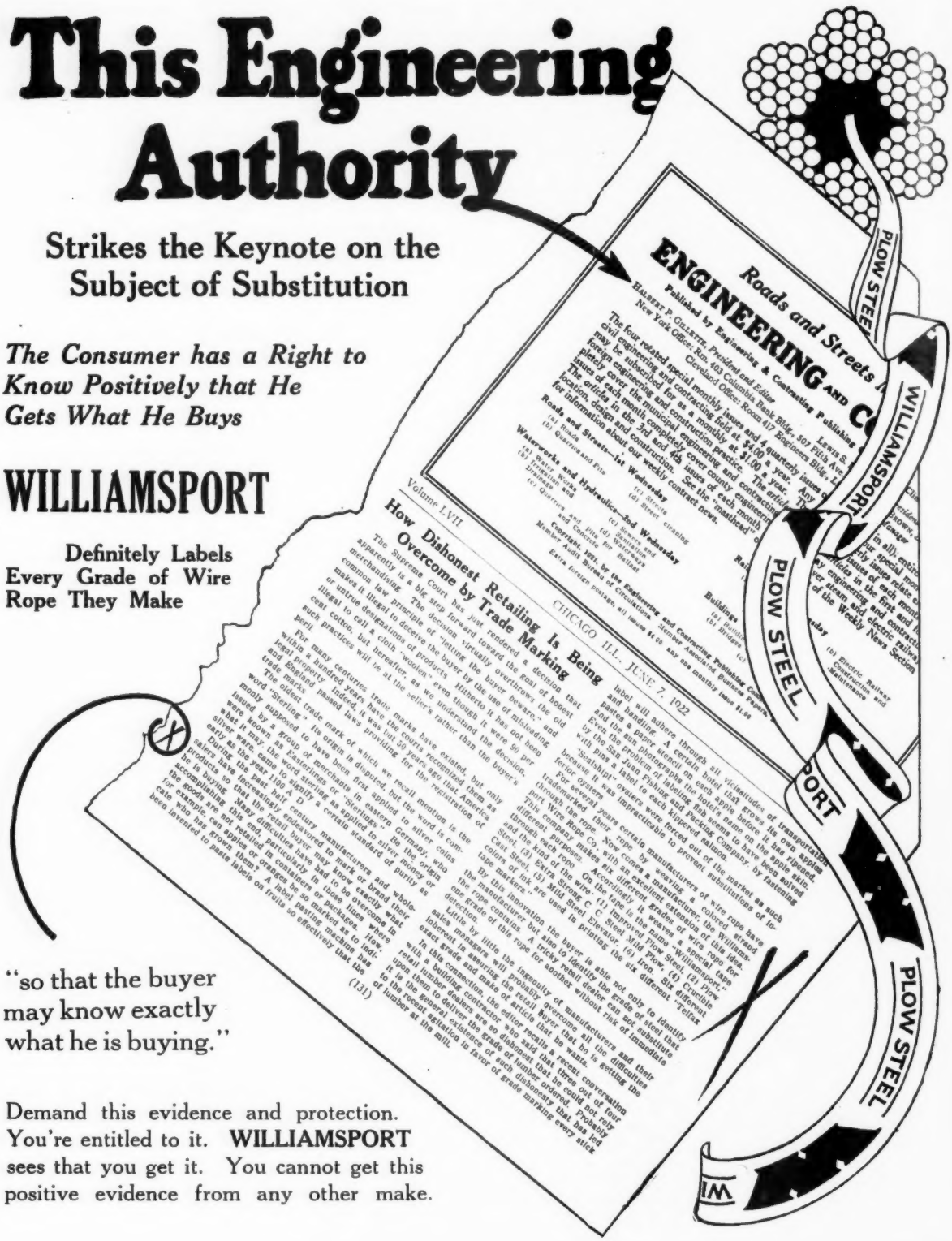
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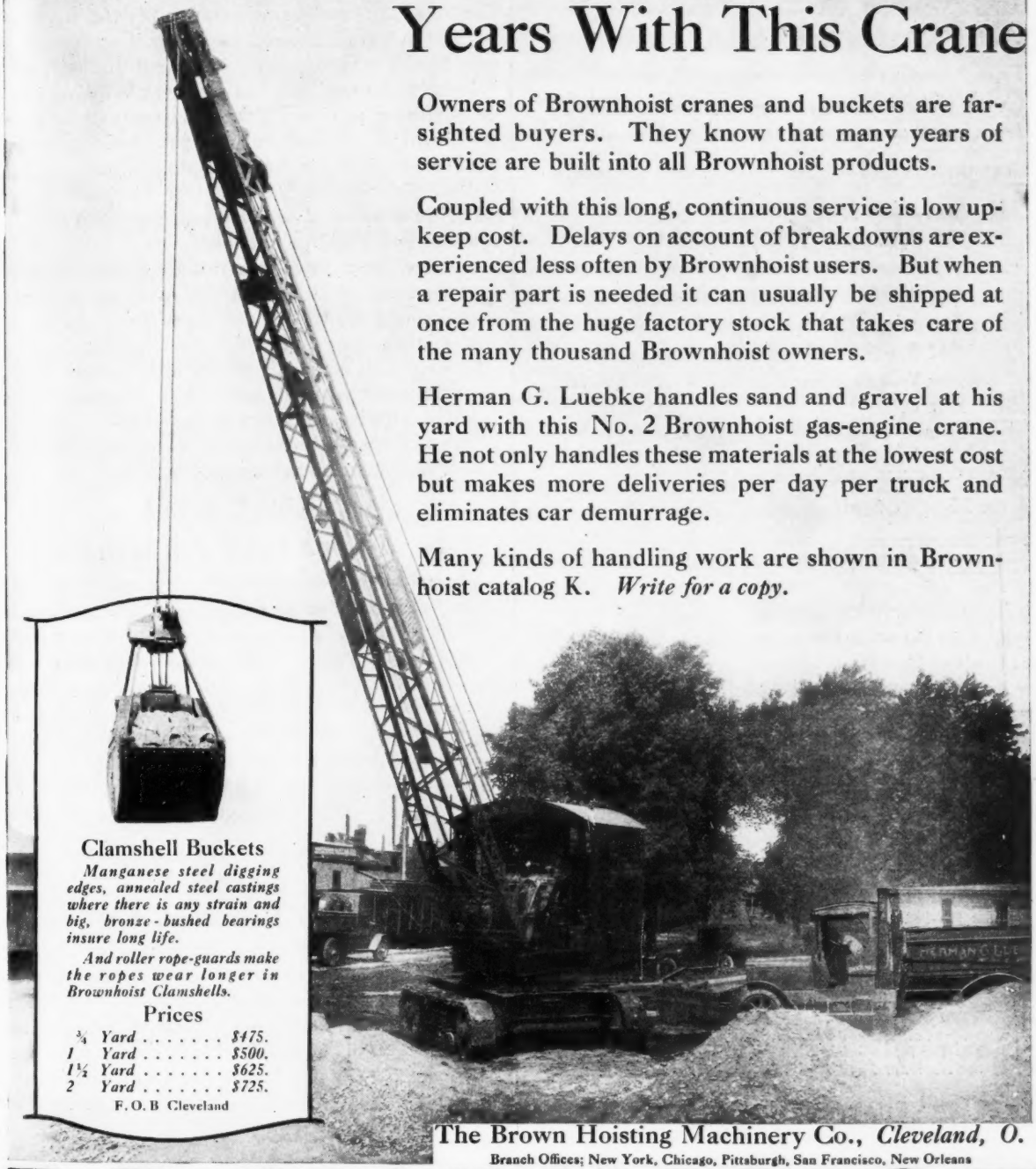
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